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ENAMELLING**

**JAMES H. GALLOWAY**



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HANDBOOKS,

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# STAINING, VARNISHING AND ENAMELLING,

BY

J. H. GALLOWAY.

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## EDITOR'S NOTE.

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The operations of staining, varnishing and enamelling woodwork, although to some extent commonplace, have undergone considerable changes in recent years. The time has passed when stains are applied to timber only for the purpose of imitating a superior wood, and many beautiful effects are now obtained by employing brilliant colours, such as reds, greens, blues and brown, thus securing a finish that is frankly due to staining and has nothing whatever about it of an imitative character.

Again, enamelling on wood has made a great advance since the manufacture of white and coloured enamels has been so much improved. By the use of these specialities, surfaces may be obtained on wood which are practically equal to china in appearance and which are exceedingly durable in use.

To describe in clear language and from a practical standpoint the art of Staining, Varnishing and Enamelling as it exists to-day, is the object of this little work. The author in every case speaks from experience and describes the operations which he has himself many times carried into effect.



## PREFACE.

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This little book is intended to explain in more or or less detail the operations required to be gone through by the house decorator in order to obtain the best results in staining, varnishing, and enamelling, and is mainly the outcome of the Author's practical experience.

Emphasis has been laid on the better classes of work ; for though a man may have such work to do but seldom, it is thought that he should at least be acquainted with the knowledge of how to do it. Something has also been said regarding cheap work, but this has not been dwelt on, because its *modus operandi* is already sufficiently well known.

J. H. GALLOWAY.

January, 1910.

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## CHAPTER I.

### THE USES AND CLASSES OF STAINS.

Staining, or the application of a special semi-transparent coating to woodwork, is generally employed to enhance the natural appearance of the wood, or to make an inferior wood resemble a superior, or, as in the case of oil stains when varnished, for the purpose of standing indoor wear and tear. Besides these, the cheapness with which the lowest class of stained work can be finished makes the operation very desirable in some quarters, although in such cases it is at the sacrifice of beauty and durability.

When stains are used to bring out the beauty of the wood to the fullest extent, they should usually be kept light, and as transparent as possible. The best colour for this is one a little darker and richer than the wood, so that, generally speaking, the colour of the material to be coated should indicate that of the stain. Thus the natural appearance of a red wood is brought out by a reddish or brownish stain. For such treatment, the wood should be the best of its kind, and well finished—not badly dressed or otherwise imperfect; because such defects are rendered more visible when the work is varnished. Of course, this class of work may be finished by flat varnishing or felting down in which circumstance slight defects will scarcely show, but whether or not the better the woodwork the better the effect. From this it is obvious that wood streaked with soft, sappy parts or covered with knots, should not be stained for the sake of its appearance. Even when it is prepared to prevent such parts turning black by the absorption of the

stain, its finished appearance is not worth looking at ; therefore when such woods are not painted, the application of stains to them should only be for utility's sake. They have little of the quality termed reflection—a satiny appearance varying with different view points—which is so essential to the beauty of wood, and may be enhanced by clever staining, varnishing, and polishing.

In imitative staining, it is also necessary that the wood be in good condition, but it is also of importance that it should have a grain somewhat resembling that of the wood to be imitated. By this means, the inferior wood when skilfully stained becomes a good likeness of the superior. Although this is the case, it will be understood that the principle cannot be extended to all woods ; for in the poorer varieties there is frequently little or no resemblance to certain of the better class, but where imitative staining is to be done, it may be accepted as a general rule that if the wood cannot be chosen to suit the stain, then the stain should be chosen to suit the wood. Thus if the woodwork of a room is yellow pine, one of the best treatments that can be adopted is that of staining it to resemble pitch pine. Again, woodwork, say, of cypress may be made to give a good mahogany effect, while curly cypress, if suitably stained, suggests Italian walnut. Any wood, though, may be stained quite legitimately in any hue—common pine may be treated with oak stain—but judged by the effect conveyed, the operation may or may not be imitative staining.

When stain is used for the purpose of standing hard wear, it is, of course, as in the most of painters' stained work, in conjunction with varnish. Without a varnish finish in one form or another, stain has very little wearing property, but with it, it wears better than the average painted job. Indeed, so much is this the case that the writer has seen rooms so treated in good condition after several years' wear, and has painted them simply because the inmates desired a change. Nevertheless, some critics assert that paint



is much more durable, but if one examines both classes of work after their having been finished for a like period, the truth will be ascertained. As a matter of fact, the paint, compared with its former state, will be more or less discoloured, while the stained work will have changed only to a deeper, richer, and more desirable colour. Not only this, the painted window shutters may be cracked and blistered, whereas the other will likely be in good condition—and this when both are employed to stand indoor wear and tear.

If, on the other hand, stain is simply used because of its cheapness, then durability need not be expected. The lowest class of this work is executed in water stain, sized one coat, and varnished one coat, and is mainly employed in common tenement work. Needless to say, if the size is used too strong, its contraction and expansion, caused by changes of temperature, invariably tends to crack and otherwise disfigure the varnish, and, again, if applied too weak, it causes the varnish to dry with little or no lustre. From this it follows that great care must be taken in regard to the strength of the size, and that this method of stained work should only be employed for the purpose indicated.

In the operation of staining, much depends on the class of stain employed. There are five classes, namely, water, spirit, oil, varnish, and chemical stains, and each of these has its merits and demerits, which must be considered when work of any kind is to be done to most advantage.

WATER STAIN, for instance, has the effect of raising the grain of the wood. The pigment, or colouring matter, too, belonging to the stain, most frequently dries on the surface of the wood treated, hence it follows that were it not for the size or other binding material, it would easily rub off with the slightest touch of sandpaper or the application of a wet sponge. As it is, very little rubbing will bring it off, and on this account, it is not at all a suitable stain for floors

and other woodwork liable to much friction. At the same time, for certain purposes, it is a valuable stain. Owing to its inexpensiveness, it is, as hinted above, of much utility in cheap work, and where wood is so rough and so soft that an oil stain would be absorbed too much, and, in consequence, turn out black, it is very valuable. Besides this, it possesses the advantage of being a time saver. It can be applied quicker than any of the other stains, and work done with it can be varnished in half-an-hour. Sometimes it is said to be superior to other stains in depth and transparency, but such is certainly not always the case; indeed, seldom, if ever, when compared with well-made oil stain. As this class of stain absorbs varnish to a great extent, sizing has to be resorted to before varnishing in cheap work. One coat of varnish is deemed sufficient in the cheapest work, but for a good job three at least are necessary.

SPIRIT STAINS are also of the quick drying class; in fact, one of their defects is that they dry too quickly. In consequence of this, they are difficult to apply properly, and, except in skilful hands, are liable to become more or less clouded and shady. Indeed, no matter how these stains are laid on, if made as the painter usually makes them by the addition of semi-transparent pigments to spirits, they seldom have the transparency of the oil class, and are not so good for enhancing the appearance of the wood. If made from dyewood or other dye stuffs, they are, however, usually quite good in this respect, and penetrate the wood almost, though not quite, as deep as oil stains. In the former case, the addition of certain pigments render the stain thicker than it ought to be, and, in consequence, through the quick drying of the spirits, the colouring matter is frequently left on the surface. In the latter case, the colouring matter is as thin as the medium, and has a better chance to penetrate the wood. Like the water stains, this class may be used with advantage in cheap and hurried work. As in the

other case, a job may be coated with it, sized, and varnished—all in the one day, and if it is a little more expensive than the other, it has the advantage of bearing out better, and thus enhancing the lustre of the varnish. It is useful for staining furniture, and when such goods are varnished with furniture or hard church oak varnish, there is no danger of tackiness—a defect that too often prevails when oil stain has been used. To get good results, this stain requires three coats of varnish, but for cheapest work, one coat, even without size, may be thought good enough. On close grained, hard wood floors, this stain, generally speaking, should not be used, as in such cases it will not stand the wear. When it has been applied to such wood, size should not be used afterwards, for owing to the hard impervious nature of the stain, the size fails to get a proper grip, and is liable to scale.

But the most indispensable stain of the painter is that of the OIL. It is somewhat slow in drying, but this defect, if defect it is, is quite outbalanced by its beauty and superior durability. There are oil stains and oil stains, and, of course, one may dry in half a day, while another will take three times that, and yet both may be equally durable, but in general the slow drying ones are the best. By drying slowly, they have more time to penetrate the wood—one of the essentials of a stain fitted for hard wear. For this reason, it is very serviceable on floors and wainscoting, and, even without varnish, will, on the latter, stand a moderate amount of usage. Of all stains, this is the one most liable to appear dry when it in reality is not ; therefore plenty of time should be allowed before applying varnish to it, as otherwise tackiness may result. In this respect furniture and church seats require most attention ; for when tackiness occurs, it is more often caused by the stain than the varnish. This stain may be easy or difficult to work—its ease or difficulty of application depending greatly on the proportion of oil, drier, and turps, and kind

and quality of pigment. Usually it takes longer to apply than water and spirit stains, and this fact, combined with its being more expensive, makes it a comparatively dear stain, or, rather, appear to be so at first. Where wood is to be brought out to best effect, and the maximum amount of durability is desired, this is the stain to use, and is without doubt the cheapest in the end. On well seasoned wood, if the permanent pigments such as the umbers and siennas are used for colouring, it will stand outside. Front doors done in this way, and well varnished, have a rich appearance which cannot be attained by paint. It has also the merit of making a good, durable job indoors when only two coats of varnish have been applied, and hence is very useful in the middle class villa sort of work as well as in that of the highest class.

VARNISH STAINS, again, have a sort of intermediate character. They do not penetrate the wood so deeply as those just considered, and do not stand so much wear, but for certain kinds of work they are none the less suitable. As their name denotes, varnish stains are simply a mixture of varnish and colouring matter, and in a manner fulfil the two processes of staining and varnishing at the one time. They are the most useful for stopping absorption, but are more difficult to rub down than the others, and when deep in colour hide the grain of the wood. In good work they are not much used, though they are valuable for wood streaked with soft parts, as their clearness is not so much impaired in such places as that of some other stains.

With CHEMICAL STAINS, painters usually have very little to do. The one most used in their case is that of ammonia, yet there are others which will be spoken of later, which would prove equally useful. These though almost colourless in themselves, have power to change the colour of woods by their chemical action, and may often be employed on hard woods, especially when any matching or darkening has to be done.

From the painter's point of view, one drawback the majority of these have is their solvent action on bristle brushes, thus causing fibre brushes, less easy to work to be used for applying them. They also discolour the finger nails, and almost everything else with which they come in contact.

Besides these stains, there are others belonging to one or another of the classes mentioned, but bearing special names. Such are Mander's and Stephens' stains belonging to the water, and Harlands' and Mander's belonging to the oil, class. These two latter are suitable for good work, having, when properly thinned, easy working qualities combined with transparency and durability. Napthaline stains also belong to the oil class, and are very suitable where rich browns and warm yellows are required. Where blocks of houses have to be done with the same stain, the ready-made article saves time that would otherwise be lost in matching, and, although the initial outlay is greater than that of making the first quantity on the job, its use as a time saver pays in the end.

## CHAPTER II.

## THE MAKING OF OIL STAINS.

## THE MATERIALS.

When it comes to the making of stains, one thing of importance should be noted—inferior materials should not be used. Such materials not only lessen the permanence, but also lessen the depth and clearness of the stain. This applies to both tinting matter and vehicle, but in a special degree to the former. The strongest procurable colouring matter should be used for this purpose, otherwise so much may have to be added to obtain a given tint that the stain may lose its stainlike appearance, and become muddy. The stronger and more transparent the colouring matter, the better will the stain be, for, it stands to reason, when much colour has to be used to obtain a given tint, the stain made from it must be less transparent than another requiring less for the same purpose. If size be used in a water stain, too, and be not of the best and palest quality, the work suffers more or less. Similarly, inferior driers or linseed oil may make an oil stain defective.

Stains, as everyone knows, are made from various materials, though their classification is, as here, usually based on the liquid employed. Thus oil stains are a mixture of boiled or raw linseed oil, turps, some terebine or japan gold size, and the colouring matter in the form of semi-transparent oil pigments; while water stains are from water, pigments, and size or

other binding material, or are merely aqueous solutions made by boiling certain dyestuffs. Varnish stains, again, are made from oil varnish and pigments, thinned sometimes with a little turpentine, or from spirit instead of oil, varnish. Spirits of wine or the cheaper methylated spirits with colouring matter produce spirit stains. As for the chemical class, they are aqueous solutions of such chemicals as permanganate of potash, carbonate of soda, and so on.

But apart from the colour, and the class of stain employed, the proportion of the ingredients in its composition should vary to suit the kind or quality of the wood to be coated if the best possible results are to be gained. This consideration is of more importance than may at first sight appear. If, for example, the same stain be applied to a hard and a soft wood, the former, allowing for difference in surface colour, will be much lighter than the latter. From this it follows that to get the same depth of tone on a soft wood, a more diluted stain is required. A similar thing may be said of close and open grained woods, but in regard to those of different colour, such as reddish and greivish woods, mere thinning of the stains will not give the same colour, though it may give a similar depth. In such cases the ground so effects the stain that two mixtures may be required to bring the woods to an identical colour. Supposing cypress and red pine happen to be in the same apartment, and are to be stained in a certain tint, it is obvious the desired effect cannot be attained simply by staining them with an identical stain. It is a waste of time to attempt it. The proper plan is to make stain that will bring the red pine to the natural colour of the cypress, then when it is coated and dry, to coat both woods with the stain selected. When woods are very dissimilar in colour, two thin coats may have to be given to one of them previous to finishing, as the transparency is in this way better retained than it would be if only one were given.

The wood has also to be considered in relation to the drying of oil and oil varnish stains. Generally hard woods will require more driers than soft, owing to the stain in such cases not being absorbed fully. In the case of oak this is partly due to the wood itself, which is anti-drying toward linseed oil. On size or other preparatory coating prior to staining, this rule should likewise be observed.

**LINSEED OIL.**—This is the principal vehicle for these stains. It penetrates bare wood deeply, and forms a valuable fixative for the colouring matter. The boiled quality being dark, and liable to become darker on exposure to light, should be used mainly for deep coloured stains, while the raw, being comparatively pale, and liable to become more so, should be relegated to the making of light ones. In making stains with tardily drying pigments, such as Vandyke Brown, boiled oil is the better medium, and when such stains are to be light a refined quality may be used. For good work these oils should be bright and clear, without the least trace of muddiness when shaken, otherwise so much of the stain's transparency is lost.

**TURPENTINE.**—As a diluent of the above oils, rendering them more transparent, more penetrative, and easier to work, this article is essential. All things considered, American turpentine is the best for this purpose, but any of the better class blended varieties containing refined shale, naphtha, or rosin spirit are not unsuitable.

**DRIERS.**—This material should always be in the liquid form, patent driers or that in the form of powder not being suitable, as these needlessly thicken the stain, thus lessening its absorption, and transparency. Any of the leading makes of liquid driers may be used for all work, but care must be taken not to use even the best in excess ; for all are contractile to some extent, and liable to cause cracking. A recent addition to good qualities of these driers is that of Messrs. Sim and Son, which is said to be non-cracking.



**JAPAN GOLD SIZE.**—This is sometimes mixed with oil stain instead of liquid driers, but in much greater proportion. Its use, however, is not recommended, for in combination with linseed oil, it makes stain difficult to work, and lessens its penetrative properties. When its use is necessary, as in cases of hurried work, the oil should be omitted and gold size with turps half and half, alone used as thinners.

**BLACK JAPAN.**—This is a rich, transparent, black varnish made from asphaltum, and when thinned with turpentine, may be considered as a stain in itself. A variety of colours may be obtained by tinting it with pigments, but it should be noted that such stains have not the brightness of those made from a good linseed oil vehicle. Stains made from this material should not be employed on other than good wood, if without a preparatory coating, a uniform appearance is desired.

**BRUNSWICK BLACK.**—The material under this name, though much cheaper than the last mentioned, also makes effective stains. It is, however, not advisable to tint this material.

**COLOURING MATTER.**—This should generally be in the form of pigments ground in oil, turps, or japan gold size, dry colours of the same class being avoided as unsuitable, owing to the difficulty in mixing them. The essential condition of colouring material for this purpose is that it be of a transparent nature, not transparent in the mass, of course, like substances such as honey, but when thinned and applied to wood. To find whether a pigment is transparent, it is only necessary to apply a thin coat to a piece of bare wood, and to see whether the grain is hidden. Dry pigments, too, if transparent, usually assume a deeper tint when mixed with oil. The best pigments for stains are those which give the deepest colour with the least opacity. Various colours eligible for use in oil stains suit this requirement. They comprise :—

Burnt and raw sienna, burnt and raw umber, Vandyke brown, Dutch pink, carmine, madder lake,

rose pink, terra vert, verdigris, Prussian blue, ultramarine, blue black, ivory black, crimson lake.

Besides these there are many others suitable for this purpose, though not so frequently used. Various lakes made from aniline produce bright, transparent pigments, but those already mentioned, though not all permanent, are the most durable.

### MIXING THE STAIN.

In mixing these stains, it is advisable to put the thinners into the pot first, then to add the basis, or principal colouring matter, and finally any pigment that may be required to bring them to the exact tint. The amount of thinners to be tinted should correspond with the quantity of stain required, and it will be found by following this method that there is less risk of making too much, or, indeed, too little, as often happens when the colouring matter is put into the pot first. Thinners should be in the proportions of three parts linseed oil to one of turpentine with a teaspoonful of driers to every pint. When using slow drying colours, such as rose pink, blacks, siennas, and crimson lake, this quantity of driers may be increased by one half. A similar thing may be said in regard to mixing these stains for oak or other hard wood. It may be observed, too, that stains containing much rose pink or crimson lake are liable to work tough, and may require an increased proportion of turpentine, but it should be remembered that all such additions render the stain more absorbent to any superimposed coating. When much tinting has to be done, it is best first to mix the pigments with a little thinners in a separate pot; because when added in that form there is little danger of the stain turning out darker than was intended. Needless to say, these stains, whether light or dark, ought always to be strained through fine muslin if good, uniform work is to be produced. After straining it will be noticed such stains are usually darker; therefore

they should be mixed a trifle lighter to allow for this change.

IMITATIVE STAINS IN OIL.—These are meant to resemble the colour of the various superior woods after they have been polished, and if the wood to be treated has some natural resemblance to the other, a good effect may be obtained. The best way to make these is to get the prevalent tone of the wood to be matched, then to modify it to the exact tint. The undernoted stains may be made with the colouring matter already mentioned. Thus :—

WARM OAK.—Burnt umber or Vandyke brown.  
COOL OR GREY OAK.—Raw umber and a little blue black.  
YELLOW OAK.—Raw umber or raw umber and raw sienna.  
RICH OAK.—Burnt sienna and black  
GREEN OAK.—Raw umber and Prussian blue, brightened if desired with a little raw sienna.  
BLACK OAK.—Vandyke brown and ivory black.

WALNUT.—Burnt umber or Vandyke brown with a little black and rose pink.

MAHOGANY.—Madder lake and Vandyke—rose pink and Vandyke—burnt sienna. Many of the bright reds now on the market also produce excellent stains of this description when toned down with a little umber.

CHERRY.—Burnt sienna.

SATINWOOD AND MAPLE.—Raw sienna and a little Vandyke brown. Varnish alone will often give the best resemblance to this last wood, especially on white pine or saugh.

ROSEWOOD.—Burnt sienna, black, and rose pink. Though it is not exactly legitimate as staining, sometimes, especially on furniture, the veins of this wood are also imitated by running the black streaks in with a feather. This is most successfully accomplished if bits have been cut from the side of the feather so that several veins may be put in at once while the under stain is flowing wet.

EBONY.—Ivory black. It should be noted that this stain is seldom successful in oil, owing to the fact of its obscuring the wood. Those made from chemicals are the best for this purpose, but when those in oil are requisite two coats of good black japan with a little varnish added give a passable result.

Note.—Both black japan and Brunswick black thinned with turps make good oak stains of a brownish hue, and the former may be used as the vehicle for the dark stains of the preceding list.

MISCELLANEOUS STAINS IN OIL.—Many distinct stains may be obtained by using the transparent pigments in various mixtures and proportions. For instance, terra vert will produce green which may be made yellowish with raw sienna, bluish with Prussian blue, and low toned with umber. In a similar way the blue, yellow, red, and brown pigments may be treated. The following are examples, the principal colouring matter being mentioned first :—

CHERRY RED.—Burnt sienna and crimson lake.

CLARET.—Carmine and a little ultramarine.

PURPLE.—Ultramarine and carmine

PEACOCK BLUE.—Prussian blue and a little blue black.

CITRINE.—Raw umber and Dutch pink.

CHAMOIS.—Raw sienna and a little terra vert.

PALE ORANGE.—Burnt sienna and Dutch pink

GREY.—Blue black, or Prussian blue and carmine.

BOTTLE GREEN.—Prussian blue, Dutch pink, and a little blue black.

MEDIUM GREEN.—Prussian blue and raw sienna.

OLIVE.—Raw sienna, Prussian blue, and a little madder lake.

Lighter and darker tints of all the foregoing, will, of course, be readily produced according to whether much or little vehicle is employed with the same amount of colouring matter

## CHAPTER III.

## MAKING WATER STAIN.

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MATERIALS.

**WATER.**—This may be considered as the chief medium, although ammonia, beer and other materials often act in conjunction with it, or wholly take its place. Not having any binding property, its use alone is mostly with the natural dyestuffs which bind themselves, and seldom or never with dry pigments. It should for stains be clean, and as free as possible from lime, as this last substance is detrimental to some colours.

**SIZE.**—As a binder and vehicle for colouring matter in the form of dry pigments, this is frequently used. Its advantage over some other binding materials consists in its power to lessen the absorpency of the wood on which the stain may be applied, consequently rendering fewer coats of varnish necessary. When dissolved in a suitable proportion of boiling water, the best quality of this should be fairly clear liquid, and yet possess strong binding property. If used too strong, it is liable to crack, and cause cracking of any coating placed over it, therefore the proportion of size need never exceed 1lb. to 40 gills of water—the most suitable strength.

**BEER.**—This is also used as a binding vehicle, and, under certain conditions, is like the last, liable to crack. To give the best results, it should be used stale, and diluted with its own bulk of water. It is the grainer's favourite binding medium.

VINEGAR.—For fixing, and also preventing the fading of water stains, especially when made from aniline dyes, this is a most useful article. Being as clear as water, it does not in the least mar the transparency of the stain. Ordinary household vinegar, used undiluted, is very suitable for this purpose. This article, though much more absorbent than the others already mentioned, has no bad effects on top coatings.

LIQUID AMMONIA.—For a similar purpose this is also useful, but owing to its odour, it is not so suitable for painters' stains. In using, the full strength ammonia should be diluted with a third of water. This does not refer to its use as a chemical stain (which see).

SILICATE OF SODA.—This is a valuable vehicle and binding medium, possessing all the merits, and none of the demerits, of glue size. It should be thinned half with water before using.

CARBONATE OF SODA.—This is the ordinary household article used for washing, and as a binding vehicle should be used in the proportion of 2lbs. soda to the gallon of boiling water. It has no power to lessen absorption of any after coatings, but in itself assists in darkening hard woods.

ALUM.—In the ground form this is most suitable, and may be used in a similar proportion to the last.

OTHER BINDING MEDIA.—Besides these above, there are many others, such as borax, pearlash, and various vegetable gums, but those already dealt with will be found suitable for all classes of work. If desired a special liquid may be made for a similar purpose, but it should be noted that it is much more expensive. Below is given a recipe for such a liquid. It is very useful in cases where the work is to be left without varnish or other upper coating, as it brightens and prevents fading of the stain.

Dissolve  $\frac{1}{2}$ lb. grain tin and about the same quantity of sal-ammoniac in a gallon of strong nitric acid by frequent shaking, then let it stand for a day or two

when it will be fit for use, and may be added in sufficient quantity to bind the stain.

**COLOURING MATTER.**—The best materials for colouring these stains are natural dyestuffs and aniline products. Common dry colours like ochre and umber may also be used, and for permanent qualiites cannot be excelled, but in water they do not fix so well, nor yield the transparency of the other materials. Being always in the painter's stock, however, they are at hand whenever a water stain is required, a thing that cannot be said concerning the first mentioned articles. Aniline colours and natural dyestuffs are seldom stocked, but there is no sound reason why the best of these should not sometimes be utilised by the painter. The following is a list of the principal natural dyestuffs ; they are of vegetable origin, and vary in their durability :—

Turmeric, barberry roots, logwood chips, red saunders wood, fustic chips, madder, orchella wood, nut-galls, Barbados aloes, Brazil wood, cam-wood, French berries, privet berries, walnut peel or extract, broom corn, blueberry, indigo, cutch, catechu, and annotta.

**Note.**—In conjunction with the above colouring matter, some of the binding media such as soda and alum are sometimes employed for the purpose of altering their tone as well as for that of fixing. Reds and blues, for example, may in this way be changed into purples.

**ANILINE COLOURS.**—As there is little or no uniform nomenclature yet adapted by the makers of these products, rather than risk any mistakes, it is wise either to buy from only one firm, or to get only the simple yellow, red, blue, green, and black, and mix them together to obtain other tints. There are two classes of aniline dye, the one soluble in spirit, the other in water, therefore this last can only be used for the purpose, and as many of them are more or less liable to fade on continued exposure to strong light, only those guaranteed fairly permanent should be bought

In any case, to counteract this tendency the vehicle should be equal quantities of vinegar and water. Messrs. Palmer and Co., London, may be recommended as vendors of these and the other dyestuffs.

PAINTER'S PIGMENTS.—When these are used, they should either be ground fine in water, or in a well pulverised state, so that they may not retard penetration of the stain into the wood. Most of the pigments mentioned in regard to oil stains are suitable here, as are also gamboge and sepia.

### MIXING THE STAIN.

When these stains are to be mixed with aniline dyes or painter's pigments, these colouring materials should first be made into a thick paste, then added gradually to the vehicle as directed for oil stains. In using natural dyestuffs, it is best to make a strong decoction by thoroughly boiling them in a small quantity of water or vinegar, as the case may be, mixed with the full amount of soda or other mordent required. This is done to dissolve or extract the colouring matter. Afterwards the exact quantity of boiling or hot water necessary to the amount of soda or other article added, can be tinted to the required depth. Stains made with these colours are best applied hot, and in some cases, require little or no binding, even though only boiled with water. Binding media for these, it may be noted, should never be size or beer, these being better suited as pigment binders. In the recipes following, the mordent, or binder is, where necessary, mentioned; if not given, none is generally required.

IMITATIVE WATER STAINS.—These may be made with water or dry pigments similar to those for oil stains. Aniline colours may also be used separately or in conjunction with each other. Bismark brown, the best known aniline colour, produces good oak and walnut stains when mixed in suitable proportion with aniline blacks and yellows. Such stains may also be made with the following materials. Before use, they should be strained through fine muslin.



OAK.—Either gambier or catechu boiled with carbonate of soda. If too brown these may be made yellower by adding a little barberry root decoction.

WALNUT.—A strong decoction of walnut peel or of walnut extract and washing soda.

MAHOGANY.—Madder and logwood chips. Madder and fustic. These should be prepared as already stated, and may be improved by coating over with a weak solution of pearlsh.

SATINWOOD.—Barberry roots boiled in water. Turmeric with a little Vandyke brown added if necessary.

CHERRY.—Spanish annatto boiled with American potash. Strength of the latter should be an ounce to half gallon of water.

ROSEWOOD.—Logwood chips and catechu boiled in water.

EBONY.—Logwood chips. Give two or three coats, then finish with a coat of vinegar in which some rusty nails have lain. Another is to dissolve gall-nuts in vinegar.

Note.—The above stains may be made by others of the dyestuffs in the list. The main thing is, as stated in regard to oil stains, to get the prevalent tone of the wood to be imitated, then to vary same with other colours. Though it is in some ways better to stick to the one kind of colouring matter, this is not essential, and, as shown in the case of satinwood, dry pigments may be used if required in conjunction with natural dyestuffs.

MISCELLANEOUS STAINS IN WATER.—For these stains, the permanent aniline colours are most suitable, but when the tone desired cannot be had free from fugitiveness, dry pigments of the painter's class or natural dyestuffs may be resorted to. From this last source may be had :—

YELLOW.—Fustic chips boiled in water. French berries treated in a similar way.

RED.—Orchella boiled in a solution of pearlash. Logwood chips and Brazil wood with preceding solution.

PURPLE.—Logwood chips and indigo in above solution. The chips should be boiled to extract the colour, then the indigo added to give the shade required.

GREEN.—Barberry roots or French berries boiled in water to which has been added some indigo.

BLUE.—Indigo with a weak solution of alum. The common blueberry boiled in water with alum and copperas also gives a blue.

RICH BROWN.—Cutch with soda solution.

Note.—A variety of shades and in some cases even tones may be produced by treating the same colouring matter with different mordants. Thus logwood when boiled with strong vinegar, or acetic acid, assumes a bright red, while if treated with the addition of an alkali such as soda, a violet is obtained.

## CHAPTER IV.

## MAKING SPIRIT VARNISH AND CHEMICAL STAINS.

## MAKING SPIRIT STAINS.

## MATERIALS.

SPIRITS OF WINE AND METHYLATED SPIRITS.— These are the only vehicles used in making spirit stains. The first, being a form of pure alcohol, dissolves such substances as dragon's blood, much quicker than the last does; hence is more suitable when such colouring matter is used. Apart from this, however, there is but little practical difference between the two, and therefore the cheaper form is more frequently used.

COLOURING MATTER. — The most suitable materials for tinting with are the aniline dyes and the natural dyestuffs. Most of the latter given in connection with water stains may be employed, and to those may be added cochineal, dragon's blood, and alkanet root. Whenever possible, though, it is advisable to use the more lasting of the anilines, as aniline colours, besides being brighter, are easier to mix than the natural dyestuffs. Painters' powder pigments may also be used, but, owing to the greater miscibility of the others they should only be employed when the desired colour cannot be obtained with the other materials. It should be noted too that pigments ground in oil do not combine readily with the spirit vehicle, and on that account are ineligible.

## MIXING THE STAIN.

The colouring matter should be mixed with a small quantity of spirit, then gradually added to the amount of vehicle necessary. When the material is difficult to mix, and, as in the case of certain dye-stuffs, has to be dissolved, frequent shaking and the addition of heat may be required. When the latter is necessary, a greater quantity of spirit should, of course, be added to the colouring matter, and great care taken not to allow any flames to come in contact with the heated vapour proceeding therefrom. The safest plan is to put the materials—colouring matter and liquid, into a clean flask, then to heat it gradually over a closed fire, shaking it at intervals until dissolved.

IMITATIVE SPIRIT STAINS.—These may be made by using similar colours to those already indicated for imitative oil and water stains. As dragon's blood, cochineal, and alkanet root are not mentioned in those lists, it may be added that these make good red and mahogany stains, and may be used alone or in conjunction with other materials.

MISCELLANEOUS STAINS.—These are best made with aniline dyes; for, besides other advantages, the desired tint may frequently be obtained in this way by using only one colour. Thus if a magenta is required, an aniline colour of that name may be bought, and used without admixture. The older colours mentioned under preceding stains, though not so handy, are also useful, but need not be given here.

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## MAKING VARNISH STAINS.

## MATERIALS.

OIL VARNISH AND SPIRIT VARNISH.—The former is the proper vehicle to use, although the latter is employed quite as often. Stains made from the oil varnish are superior in durability and lustre to those

made from the other medium ; hence when good work has to be executed with varnish stains, the former should have the preference. For medium and dark coloured stains, the ordinary oak and copal oil varnishes and brown spirit varnishes are suitable, but for light tints pale copal and white spirit varnishes are best. Sometimes for light stains, the dark varnishes are made lighter by thinning with turps or spirits of wine, but this is not recommended, as the lustre is then so much reduced that even with two or three coats the work can hardly be said to be varnish stained.

COLOURING MATTER.—When an oil varnish is the vehicle, the best tinting materials are the transparent pigments ground in oil ; while if the spirit vehicle is used, aniline dyes and other dyestuffs are preferable. Dry pigments, as usually employed by the painter, being liable to cause grittiness, should be avoided in both cases.

### MIXING THE STAIN.

There is not any difficulty in making oil varnish stains, the varnish chosen simply being coloured to the required tint. Spirit varnish, on the other hand, requires the colouring matter to be mixed first with spirits or naphtha before being added ; otherwise, owing to the shellac contained in the varnish, there may be a difficulty in tinting it. As stains made from the latter varnish are really spirit stains with the addition of shellac, it follows that the directions already given under that heading apply almost equally here.

IMITATIVE VARNISH STAINS.—The colours stated to be suitable for imitative oil stains are also suitable for these when the oil varnish medium is used. With the other vehicle, the colouring matter—anilines and other dyestuffs, already mentioned under other imitative stains, are most useful.

MISCELLANEOUS STAINS —Colours already indicated for making certain oil and water stains of this type may likewise be used with the varnish vehicles.

## MAKING CHEMICAL STAINS.

The chemical agents employed for this purpose usually require mixing with water. They are of two kinds. One has to be dissolved, then diluted; the other may be diluted at once. To the former class belongs permanganate of potash; to the latter, substances such as nitric acid. In mixing these stains the chief difficulty is to know when the desired strength for a given tint is obtained. So much depends on the kind and quality of wood to be treated that it is always best to coat a similar piece of wood, and to allow it to dry before proceeding with the work; as otherwise, unless one has much experience in making such stains, unsatisfactory results are liable to accrue. This class of stain generally dries much darker than when applied, and for this reason should on application appear much lighter than the required tint. It is advisable to make only the exact quantity needed for any given piece of work, but in events of making more, it may be kept safely in earthenware jars tightly corked with gutta percha stoppers. Owing to their chemical action on metal, these stains should also be put into earthenware pots when they are to be used. Below are given some useful staining chemicals:—

**PERMANGANATE OF POTASH.**—On the majority of woods this gives an excellent brown stain inclining to an oak hue, and when applied to ash a superior imitation of oak difficult to detect. Stains made from this are much used for darkening oak and other hard woods when used as furniture, wainscoting, or flooring. When first applied this stain has a crimson appearance which eventually dries off. A medium tint is procured by using three ounces of potash to half a gallon of water.

**BICHROMATE OF POTASH.**—This makes stains of a slightly yellower hue than the preceding when applied to most woods, but gives to elm, ash, and beech a greyish tinge, not given by the other. Generally speaking, however, these two chemicals are much alike.

**NITRIC ACID.**—When diluted with from four to eight parts of water, this material gives good yellow stains, and when stronger, stains of a reddish or brownish yellow—the exact tint depending on the wood. Like those mentioned above, this is a permanent stain.

**SULPHURIC ACID.**—A yellow stain is also given by this when diluted, but when used full strength or nearly so, browns. On one of the most favoured woods for building purposes—red pine—this gives when used in certain proportions a beautiful neutral grey. The application of heat to wood while wet with it, also produces a black or ebony stain.

**LIME.**—For giving mahogany the appearance of age, and darkening some varieties of walnut, this is an effective material.

**CARBONATE OF SODA, PEARLASH, AND POTASH.**—Strong solutions of these, either alone or in combination, produce useful stains for oak, walnut, and mahogany.

Besides these many other chemicals are useful for staining, such as nitrate of silver, sulphate of iron and of copper, picric acid, and so on. The tannin contained in tea, and the caffeine in coffee also furnish stains of a brownish hue when applied in concentrated solutions to hard woods. Sometimes to get a particular effect, it is advisable, indeed, necessary, to use more than one chemical. Thus:—

**BLUE.**—Copper filings, nitric acid, pearlash. The first is dissolved in the second, then applied to the wood. Afterwards a coat of pearlash solution (4 ounces to the quart of water) is applied to bring the wood to a blue. Sulphate of copper and oil of vitriol mixed in the proportions of eight sulphate and one vitriol also give a blue colour.

**GREEN.**—Sulphate of copper and a little bichromate of potash mixed in sufficient water.

**EBONY.**—One of the most durable and transparent ebony stains is produced by applying to wood a solution of chlorhydrate of aniline to which has been added

a little chloride of copper, then when dry, coating with bichromate of potash. This process may have to be repeated two or three times, as much depends on the wood under treatment.—Boil logwood extract in water, then add yellow chromate of potash. This makes a purplish colour which turns black on application.—A coat of logwood solution followed by one of iron sulphate.—Any durable black writing fluid may also be employed. It should be noted that apple, pear, chestnut, hazel, and sycamore are the most suitable woods for ebonising.

NOTE.—As some of the chemicals mentioned are very poisonous great care must be exercised in using them.

AMMONIA.—As a chemical stain this liquid may be applied direct to the wood with a brush or indirect by fumigation—letting the fumes act indirectly on the wood. When it is laid on with a brush the result is never quite satisfactory ; therefore the latter process is generally preferred. Though some other woods may be fumed, oak and mahogany are the woods that are usually treated. The process is as follows :—

To fumigate, say, a wainscoted dining-room, it is essential first of all to make the woodwork clean, then to make the apartment absolutely airtight. Without these two precautions, the fuming will be unequal and unsatisfactory. Any grease, or even finger marks, however slight, prevent the ammonia from acting, thereby causing light spots to appear in the finish ; while any outlet for air allows the fumes to escape and causes unequal fuming. After these preliminaries, two or three soup plates filled with the liquid should be placed in the middle of the room, and allowed to act. The door may then be made airtight from the outside by pasting paper round the edges. After an interval of ten hours or so, the room should be looked into to see whether the wood is sufficiently dark, and if not, the door should at once be closed again. In judging whether the work is dark enough, it must be



remembered that it will eventually dry out a shade or two lighter ; therefore due allowance must be made. As soon as the process is finished, the ammonia should be removed, and all windows flung open to stop further action. The best plan is to close the room at night, and allow the ammonia to act till the next morning. When small articles have to be treated, they may be placed in an airtight box containing a glass pane through which the progress of the work may be watched. It need hardly be stated that fumigation gives oak a dull brownish appearance which would naturally come to it by age, and which is retained at any shade by oiling, waxing, or polishing.

## CHAPTER V.

PREPARATORY TREATMENT PREVIOUS  
TO STAINING.

## NEW WOOD.

SANDPAPERING.—If the wood is perfectly smooth and clean, this operation is seldom necessary, but if it feels rough when passed over with the hand, or has a raised grain, then it should be given a slight rub. No. O is best for this purpose, and to use it skilfully it should be held quite flat against the wood, and rubbed up and down the grain with an equal pressure. Special care must be taken never to rub across any part of the grain ; for if this is done, and the stain be then applied on the bare wood, such parts will turn out darker than the remainder. Tops, bottoms, and corners of panels should be well gone into, but rubbed in the same manner as the rest of the work—with the grain. To obviate the risk of scratching, the wood should be thoroughly dusted previous to rubbing. In treating large surfaces, a flat piece of cork five by two and a half inches is very suitable to wrap the sandpaper round so as to secure level contact with the wood.

TREATMENT OF DIRTY WOOD.—Sandpapering will frequently remove dirty marks, but care must be taken not to abrade the surface by undue pressure at such parts. A better plan is to wipe them with a linen rag dipped in turpentine, or what is preferable, benzine. When marks are of a sooty character a sponge dipped in soapy water, and applied lightly, will

often do good. They should, of course, be sponged with cold water afterwards, and allowed to dry before staining, stopping absorption, or filling.

**TREATMENT OF LIME-COVERED WOOD.** — Frequently when a new house is being plastered some of the woodwork gets covered with lime spots. These the plasterer may brush off so that the painter may not notice they had existed, but when the work is stained, at least, without any preparatory coating, a number of dark spots become visible, due to the lime having effected the wood by chemical action. When there is any risk of lime spots having been present, the wood should be sponged all over with clean water, then given a coat of vinegar. This prevents such spots, and gives the stain a uniform appearance. When the work is visibly covered with lime, it should be well brushed off, but not sandpapered off, as such a method of procedure rubs the lime in, and makes matters worse. If the wood is rough, sandpapering may be done after the sponging has dried, and previous to coating with vinegar.

**TREATMENT OF OIL MARKED WOOD.**—When wood is spotted with oil or grease, the spots almost invariably turn out lighter than desired, and often to the complete detriment of the finished work. To remedy these, rub well with a little benzine, and finish off with a rag dipped in fine whiting.

### STOPPING ABSORPTION.

When wood is of bad quality, poorly dressed, or it is desired to make it of an absolutely uniform tint, or to lessen the number of finishing coats, this operation is resorted to. Any of the undernoted materials may be used for the purpose :—

**GLUE SIZE.**—Owing to its cheapness and speed in application, nothing is used so frequently as this. If used too strong, however, it has a tendency to expand and contract under changes of temperature, and may induce cracking of stain or varnish placed over it. A

satisfactory strength to use is that of forty gills water to the lb. of size. It should be applied in a warm condition so as to adhere and penetrate well, and reduce the risk of too thick a coating being laid on, which through time would probably peel off. The coat on the mouldings especially must be thin, and well wiped out with a fitch, as it is in such parts that the size is most liable to lie thickly.

SPIRIT VARNISH.—For completely sealing the pores of the finer woods, this material is useful, but stains do not adhere to it so well as to some other stoppers. The palest quality should always be used if the best result is desired.

PROOF PRIMING VARNISH.—This speciality made by Smith and Rodger of Glasgow fulfils the functions of the last mentioned article, and has the additional advantage of being cheaper.

JAPAN GOLD SIZE AND TURPS.—To assist the production of even staining on soft or sappy wood, these when used half and half, prove excellent. It dries quickly, and is not detrimental to upper coatings. Being readily sandpapered smooth, it is suitable for good work.

OIL VARNISH.—In many ways this is the best for the purpose indicated. It should be thinned with a little turpentine so as to rub down easily when dry. The depth of oil stains when applied over this is much increased, and afterwards when varnished, still more so. Varnish for this purpose should be a good church oak, and not too dark.

NOTE.—The foregoing are more or less suitable beneath all stains except those made from chemicals.

## FILLERS AND FILLING IN.

FILLERS.—These are for filling, and thus making level the pores in wood, and are analogous to the filling up used in connection with painting. They are mainly used for coarse open woods, such as oak and ash, but are also well adapted for giving high class

finishes to the commoner woods which have frequently to be stained by the painter. For these latter, or soft woods, a liquid form of filler is usually employed, and for the others, or hard woods, a paste form. Such fillers ready for use may be bought from the various varnish manufacturers, but can also be made at the job or in the workshop. The fillers should, of course, be tinted to match the colour of the wood or the stain upon which they are to be laid if these are medium or dark coloured, but in other cases, tinting is not required. Dry colours, such as yellow ochre, umber, lamp black, and venetian red are usually employed for this purpose, but if a stain has been applied previous to filling, the colouring matter of it—if not a chemical—is quite suitable. Below is given the composition of some useful fillers, but without any colouring matter :—

(1) Finely ground plaster of Paris and methylated spirits or water. These ingredients should not be mixed into a paste, for they are best used separately.

(2) Cornflour, one part boiled oil, two parts turps, and a little Japan gold size, mixed to a suitable consistency.

(3) Pulverised whiting and turpentine.

(4) Russian tallow mixed with whiting.

(5) China clay, a little patent driers, and boiled linseed oil mixed to a pasty condition, then thinned with turpentine.

(6) Ground quartz mixed with one third each of Japan gold size, turps, and boiled oil.

**FILLING IN.**—The operation of filling in may be performed on the bare wood, or after the application of stain to its surface. Sometimes before filling in on bare wood, a preliminary rub with a rag dipped in linseed oil is given, so as to make the filler adhere, but except in the case of whiting and turpentine filler, this is not necessary. When fillers are thinned for the finer grained woods, they should be applied with a brush, but when used in the paste form, a linen rag is more suitable. In either case after the filler has stood

a sufficient time to set, the surplus should be rubbed thoroughly off the surface with rags or tow. This rubbing should be across the grain so that it may rub the filler into the pores while taking the remainder off the surface. After the filler has hardened properly, say, at earliest, next day, the work must be well sandpapered and dusted, any hard surplus filler in the quirks of mouldings being picked out with short sharp pointed or wedge-shaped pieces of wood previous to the operation. After this is completed, the wood is not quite smooth and level, filling in will have to be resorted to again. For a high class finish on coarse wood, this operation may have to be gone through several times.

The above is the manner of using fillers in general, but when plaster of Paris and methyated spirits are used, they should be placed in separate dishes, and the spreading rag dipped into the spirits, then dabbed into the plaster, and applied. As this filler sets quickly, rubbing off should be commenced immediately after treating a yard or two.

NOTE.—As a filler for plain varnish work on pine wood, varnish itself used undiluted, and properly rubbed down, gives a satisfactory result, as also does several coats of French polish on wood which is eventually to be polished. The main difference between these and other fillers is that these are more expensive.

### PUTTYING.

This is generally carried out by the painter after staining, but sometimes it is advantageous to putty first. When wood has to be stained, and left in that condition without any further finish, the latter treatment is the best, as the putty is then stained in with the wood, and sure to be of a uniform tint, rendering nail holes and bad joinings almost, if not, invisible. In puttying on the bare wood there is in unskilful hands a risk of marking around the parts puttied by letting the putty touch the surface of the wood, thus

causing an oil mark which dries out light when stained, owing to the stain not being absorbed properly there. To do this part successfully, only the tip of the putty knife should be used in conjunction with just sufficient putty to fill a nail hole at a time, and care taken to place the putty exactly in its place without touching the surface of the adjoining wood. A similar manner of puttying is, of course, necessary even in puttying on the top of the stain when the latter is not to be varnished or polished. It may be observed that putty for use in stain work should be tinted much darker than the stain so that when the stained work darkens with age both putty and stain may be alike. Oil putty is generally used for this purpose, but for water stains, that made from two parts whiting to one of plaster of Paris is best.

### THE TREATMENT OF OLD WOODWORK.

**PAINTED WOOD.**—When it is desired to stain this, the paint must first be thoroughly cleaned off with a good paint remover. This process is slow, and, especially on mouldings and other recessed parts, many applications of remover may be required before the surface is quite clean. When this has been successfully accomplished, though, the wood should be bleached by applying a weak solution of oxalic acid, letting it remain on over night, then washing off. After the wood has dried, the grain should be sand-papered down, and any white putty in nail holes and other parts touched up with a little stain or even paint to match the general appearance of the wood previous to filling in, staining, and so on.

**VARNISHED AND POLISHED WOOD.**—Common woods that have simply been varnished, if not too dark in colour, only require a preliminary cleaning by washing, and a rub down to form a good ground for staining. If the varnish is too dark, however, it must first be removed by using strong ammonia or a paint

solvent. Afterwards to still further lighten the wood, bleaching may be necessary. Polished woodwork which is to be stained may be treated in a similar way, but when removal of the polish is necessary, methylated spirits or a paint solvent is used, and never ammonia.

WEATHER STAINED OAK.—It frequently happens that an oak front door becomes badly blackened and marked by the weather, and requires to be stained, varnished, or oiled. In such a case, the work must first be thoroughly cleaned by applying a solution of pearlash, letting it remain on for a short time, then when the varnish or oil has softened, washing the whole thing down. Afterwards oxalic acid should be applied if the wood is not light enough, and when this has been washed off, and the surface properly dried and sandpapered, the finishing may be commenced.



## CHAPTER VI.

## STAINING.

## GENERAL APPLICATION.

To apply stains properly speed and good brush work are essential. For the production of good work these are necessary in all classes of staining, but more especially in spirit and varnish staining, as in such cases, owing to the quick setting of the vehicle employed, little time is given for application. Speed, of course, is very much a matter of individual energy and practice, while good brushwork is very much a matter of method. At any rate, in regard to speed, it is always best to apply stains as quickly as possible unless they are positively known to be of a slow setting nature. One safe and useful plan in applying stain is to think of it as flat paint, and to adapt the method of procedure that would be adapted for it. Thus, in doing an architrave, the work should be commenced at the bottom of the right hand side, continued to the top, then across that part, and finally down the other side to the opposite bottom. This prevents any laps, as the work is continued from beginning to end without a break—one essential condition to all good staining. On large panels the avoidance of laps, or, in other words, dark brush marks due to working over stain after it has set, is with a quick setting stain very difficult. The usual method of doing a panel by first coating the mouldings, then doing the remainder, though quite suitable in general, is not satisfactory in such cases.. The best way of using a quick stain on such surfaces is to run a small toolful along the right hand side of the panel close to the moulding, then to

take a large brushful, and apply it close to the edge of the last application, and so on, till the other side is reached, taking the precaution to finish off each brushful as soon as it is laid on. This finishing off need be no more than a light crossing of the stain with a light finishing up and down stroke immediately after. This is very simple, yet through lack of thinking on such a method the writer has seen a good workman spoil the panels of an important room. To coat around mouldings, then apply a brushful to the middle of the panel, and, in consequence, have to keep two edges going, is obviously an inferior method of working, and especially is this so when each brushful is not finished off at once, and the whole panel is coated over with the expectation that it may afterwards be satisfactorily crossed and laid off. When laps do occur, however, whether on panels or elsewhere, their appearance may be improved to some extent by scraping the brush dry, then rubbing the defective parts with the side, or by wiping lightly with a rag free from fluff.

The amount of stain to be applied varies. Generally speaking, bare wood requires a fuller coat than prepared wood, but whatever amount is applied to one part of the same work should be applied to the other ; for otherwise, if the wood is all alike, different shades will result. When applying much stain, especially on prepared wood, great care must be taken in finishing the tops and bottoms of panels, as such places are liable to appear lighter than the rest owing to the brush partly drawing the stain away in finishing off. To prevent this, the brush should be swept lightly upwards towards the moulding and downwards toward the bottom, taking care in doing so not to make a brush mark where the brush first strikes the panel. The tool, needless to say, should be held lightly and glided or skimmed over the stain just with sufficient pressure to give an equal appearance to the defective parts. A broad fitch or a flexible sashtool may be used for this purpose if the panels are small,

but otherwise a good class, thin toed varnish brush is the best. In regard to this last defect, it should be borne in mind that it is more liable to occur on the top of varnished wood and non-absorbent surfaces, and when a slow setting stain is employed.

STAINING A DOOR.—The architrave should first be done, then the top and bottom panels with their respective mouldings, and finally the door thickness and stiles. In doing these last, it is safest to begin with the bottom upright centre stile, then to do the top centre one, next the lock rail, and lastly, the top and bottom rails and outside stiles in the order mentioned. If the stain is quick setting it is advisable to coat each part of the stiles without touching the neighbouring parts, as such touches invariably set before the parts can be stained completely. This may readily be done by running along the joinings with a small tool, then filling in the rest of that special portion. When staining can be done without this precaution, it, of course, means an increase in speed, but it must not be forgotten that in such cases, the small amount of stain which has been applied beyond the one particular rail under treatment should at once be brushed in the direction of the surface it has for the time being encroached upon. To do so gives the stain a better chance of turning out well, and causes very little extra work.

SKIRTINGS AND MARGINS.—The first may be done similar to the manner recommended for architraves, but unless with a very slow stain, no more than three feet should be coated at a time ; that is to say, the top and bottom of the skirtings should not be cut in the whole length, and then filled in ; it should rather be cut and filled in by degrees, otherwise lapping may accrue. Something similar applies to margins ; in the case of broad ones only, two or three planks should be taken along at a time. In staining these it should always be contrived to finish up at the entrance door ; as then, the last brushfuls may be spread from the outside o f

the room, and thus prevent stepping over the margin when finished.

STAINING AND WIPING PLAIN WORK.—This is employed when the figure of wood is to be brought out to the fullest extent, and in sharp contrast. Plain even grained woods whether hard or soft are of little use for this purpose, but woods like red and pitch pine give excellent results. A full coat of stain is applied in the usual way, then while flowing wet is wiped off with rags. By this means the harder parts of the grain are made lighter than the other parts, due to difference in the absorbing power of each. As there is not any risk of laps or brush marks by this method, it is very suitable for large surfaces. Oil stains are best suited for this kind of work, and give the best results if coloured unlike the wood. In this latter respect, green and blue stains are preferable to yellow ones.

STAINING AND WIPING RELIEF MATERIAL.—The material must first be grounded with a suitable colour. Ordinary oak grounds are very well adapted for the majority of stains, although for special effects any coloured ground may be employed so long as it is kept much lighter than the stain. After the work has been sized, and grounded—preferably with varnish colour, the staining is commenced. This may be in either water or oil stain, but in the latter case, the wiping should not take place till the stain has partly set, and in the former, not till it has dried. To do the wiping a bit of cloth is rolled round the thumb, and applied to the heights so as to remove the stain almost wholly, yet not quite. Round the edges as it were of the heights the cloth should then be passed lightly so as to soften any hard lines that may have been formed by the first wiping. After this, the whole surface may be gently dabbed with the cloth, but such effects, or those resembling them, may also be obtained by heavy stippling before the stain has set, and previous to

wiping. When water stain is used a wet chamois takes the place of a cloth.

### UNIQUE EFFECTS IN STAINING.

When the common appearance of stained work is undesirable, various uncommon effects may be obtained by dabbing, mottling, stippling, or otherwise working on the stain. Thus:—

**MOTTLED WORK.**—To get this effect a coat of light stain should be applied, allowed to dry, then coated with a darker stain of similar colour, and, while flowing wet, dabbed all over with a coarse sponge, or treated with a mottler, and finally softened off with a hog hair softener.

**MARLED EFFECT.**—This may be obtained in a manner similar to that mentioned above, but instead of stains of one colour two of different colours are employed. A better way, however, is first to varnish the wood, then when it has dried to place small splashes of the various coloured stains here and there, and to soften them together just sufficiently to remove any risk of ridges or running.

**BLENDED EFFECT.**—To stop absorption, and prevent the stains from setting too quickly, the work should first be varnished. After this two stains, say, an amber and a green, are applied to the work, one five or six inches from the tops and bottoms of each panel, and the other between the patches thus formed, then at once blended together with a softener or run together with a flogger. In this way various blended effects may be got. A strip of stain an inch or two broad may be run round the inside or outside of the panels, and blended into the other, or strips may be placed at the junctions of the stiles and cross rails, and there treated.

**STIPPLED EFFECT.**—This should also be done on a varnished ground, and simply consists in heavy stippling of the stain. Only close woods with little prominence of grain are suitable for this treatment.

**CARVED WORK EFFECT.**—An effect somewhat resembling the appearance of carved wood may be had by stencilling in varnish on the bare wood a heavy foliage pattern, then immediately softening the edges with a flat hog hair fitch, and when dry coating over with thin oak stain, and stippling. Particular attention must be given to the blending of the sharp edges of the varnish into the surrounding ground, for the cut out effect mainly depends on the skill with which it is done.

### THE FINISHING OF STAINS.

Though oil, varnish, and chemical stains are sometimes left without further treatment, they, like the others, are usually treated in some way. This finishing of stained work is a means of increasing its durability and effect. Among the modes of finishing practised by the painter are the following :—

**WAX POLISHING.**—This consists in applying to the work a thin coat of wax dissolved in turpentine, then when it has dried, rubbing it with a fibre scrubbing brush, or one made specially for the purpose, and lastly with coarse cloth until a polish is obtained. The composition is made by taking some good yellow beeswax, shredding it finely into a little turpentine (not substitute), and melting over the fire, or by simply melting the cut wax in a pan over the fire, then adding the turpentine after the pan has been lifted off. This last method, being much less dangerous, is recommended. The mixture should be allowed to cool before being applied to the work, and if too thick may be diluted with more turps. When two or three men are working with wax in the same apartment it is not only necessary to see that the fluidity of the material is the same in each case, but also that a similar amount is being applied, otherwise different results will follow. As a general rule, the polish should be used thin on all fine, even grained woods, and thick on all the coarse, open grained varieties.

**OILING.**—This process is often resorted to for mahogany table tops, and bringing out the grain of woods such as pitch pine, but may also be employed on any wood which has been oil stained. Boiled linseed oil is the material, and is simply rubbed into the work with a rag until the oiliness is almost imperceptible to the touch. Various rubbings are required at intervals of a day or so until a dull egg-shell polish is attained.

**FLAT AND OIL VARNISHING.**—Where a dull, and inexpensive finish is desired, flat varnish is usually used, but where a lustrous and highly durable finish is wanted, the oil quality holds sway. As, however, these two materials, and their mode of application are dealt with later, no more need be written here concerning them.

**FRENCH POLISHING.**—This operation is seldom practised to any extent by the decorator, hand rails being usually the only things done by him, more important work being, for the most part, relegated to the French polisher. As, however, hand rails are not altogether unimportant, and little is known about the operation among some decorators, the following instructions may be useful. When the work has been coated, preferably with a spirit or chemical stain, the initial operation called "bodying in" should be commenced by applying French polish lightly across the grain of the wood with a piece of thick flannel or a pad of cotton wool covered with calico. The application should be done quickly, and care taken not to go over the same surface twice; for if this be done, and the polish happens to have set, there is a danger of picking up the film and causing rough ridges, detrimental to the finish. When this coating has hardened and been sandpapered, others should be applied until they are found to bear out with a uniform surface fit to receive the "spiriting off," or finishing process. This consists in taking a new and perfectly clean rubber of cotton wool, dipping it into a half-and-half mixture of methylated spirit and polish, then covering it with a double ply of cotton, and rubbing the work over with

the pad thus formed. This process must be gone through several times, each time diluting the mixture with spirit until nothing but spirit is being used, and a fine, smooth, uniform lustre results. This part of the work should be done lightly, and each rubbing continued until the surface is dry, special care being taken not to moisten the work too much, and not to rub hard until finishing off the last time.



## CHAPTER VII.

## VARNISHES AND THEIR USES.

Varnishes may be roughly divided into three classes, water, oil, and spirit, according to the vehicle employed in the process of making. The latter two, embracing the principal varnishes used by the painter, may be sub-divided into hard and elastic varnishes, although there is, of course, no hard and fast line between the two qualities. There are not any hard varnishes without some degree of elasticity, nor any elastic ones without some amount of hardness ; yet such terms, though in reality comparative, are nevertheless most useful and appropriate as denoting the suitability of varnishes for different purposes. Spirit and church oak varnishes are types of the hard drying qualities, outside copals of the elastic. Owing to this difference in elasticity, the latter type should never be placed under the former, as in such cases their greater expansion and contraction would be liable to cause cracking of the upper surface. When there is any doubt as to the comparative hardness of two varnishes which have to be used one under the other, it is a safe plan to add a small percentage of turps to the under one ; or, as an alternative, to rub it out very sparingly, and allow it to harden thoroughly for at least a week before finishing. A test in such cases is to apply a coat of each to different pieces of tin, allowing them to harden for a day or two, then scratching with the thumb nail to see which is harder or bending the tin to see which is more elastic. The need of such procedure is avoided, however, if a similar brand of the same maker is used right through.

Apart from these qualities, the colour of varnishes is also of importance. Certain varnishes are not suitable for application over certain colours. It should not simply be a matter of having a varnish suitable for a given colour at a given time, but one of having it permanently so ; for apparently suitable varnishes in this respect may turn dark in a few weeks or months, and, as a result, disfigure, it may be, good craftsmanship. This is particularly applicable to varnishes chosen for applying over delicate tints. In all such cases either the makers guarantee should be asked, or the material should be tested for a sufficient time on a suitably coloured ground. It may be noted that though some of the palest varnishes bleach for a time after application, they may eventually return to their original yellowness. This is especially the case if they are used in badly lit rooms.

Durability is another important quality desirable in a varnish ; indeed, by far the most important ; for in a sense, it embraces the others. A varnish not hard enough or elastic enough for its special purpose cannot be durable, and a similar thing may be said of a varnish which sooner or later becomes unsuitable in colour to the ground it is applied over. It is in regard to the lustre of gloss varnishes, though, that durability is here spoken of. Apart from the bringing up of the bottom coats, whether of paint, stain, or varnish, this is much influenced for good or bad by the gum employed in the manufacture, the mode of making, and the maturity or age of the varnish. Those made with copal, amber, and kauri gums are amongst the standard varnishes possessing this quality when properly made and properly used, but to enhance the likelihood of a varnish having a fairly permanent lustre, a fair price should be paid per gallon, qualities under eight shillings being eschewed unless they have already gone through a successful test. This test should have been in the form of exposure to the actual conditions under which the varnish is meant to be used. Thus a floor varnish

should not be condemned if it will not last out of doors, neither should an outside quality be condemned because it will not stand on a floor. On a floor, hard varnishes last longer, on outside work elastic ones—the one quality being more durable in regard to standing friction; the other in standing atmospheric changes. Other things being equal, the more elastic a varnish is, the better will it stand changes of temperature, and the harder it is, the better will it stand handling.

THE USES OF VARNISHES.—Varnish makers assign to various varnishes different uses. Such uses are given below, as are also those known to the painter from practical experience.

WHITE OIL VARNISHES.—These include White Marble, Coburg, and French oil varnishes, and are for the best work. Though they are the nearest to being colourless possessed by the decorator, they are when durable far from water clear. For white or delicate tints their use is the most satisfactory. They are also suitable for mixing with white paints, and may be used on maps, wallpapers, and even in place of mastic varnish on oil paintings when they are not of great value. Owing to their clearness, they are the most suitable for lettering on ground glass when an embossed appearance is desired. Exterior, as well as interior, work is done with these varnishes.

MAPLE VARNISHES.—These are for application over imitations of maple, or other grounds not exceeding maple in paleness. They are cheaper than the last mentioned, and next to them in paleness of colour.

OAK VARNISHES.—These, as their name denotes, are for use on woodwork not lighter than ordinary imitations of light oak. They are amongst the cheapest varnishes, and are suitable for general work where colour is not an object. As they generally darken considerably, the ground they are applied over should be much darker than they to begin with. Under the names of church oak and floor varnish are sold varnishes suitable for furniture, public halls, and other

things, and places likely to be handled, touched, or rubbed against. For mixing with paint, if the tint desired be not delicate, the pale copal oaks are useful. All the ordinary oaks are made in two qualities—outside and inside, but it is often wise to ignore this division, and use the exterior varnish on corridor and staircase doors, and insides of much exposed window sashes, as the risk of blooming during drying by deposits of damp air on the surface is in this way obviated, and the durability of the sun exposed parts is increased.

PAPER VARNISHES.—These are of two kinds—crystal and oil, and the latter may be had in different degrees of paleness. The crystal paper variety should not be used on paper which will require to be washed ; for, though paler than most of the other variety, it does not wash well. Whether washed or not, however, it is not nearly so durable as the oil quality. Moreover, it should not be mixed with paint, as it is liable to cause peeling ; therefore, its chief recommendation is its paleness, and consequently easily workable properties when applied over light papers. The oil paper varnishes, though on the whole more difficult to work, are much more durable and washable, and may also be used for wood—are, indeed, specially suitable for woodwork of wash-houses and laundries, where steam is of frequent occurrence.

CARRIAGE VARNISHES.—Those under this name are commonly used by house decorators for outside doors and windows, but for this purpose some of the outside copals are much better, as carriage varnishes are not intended for application under the adverse circumstances attendant on outside work. Their application is best conducted in rooms of a moderate and equable temperature, hence their proper use is for the body and wheels of motor cars and carriages which may always be treated under uniform conditions.

BATH VARNISHES.—As the name implies, these are suitable for resisting hot water, and are employed on the insides of painted baths, hot water cans, and

such articles. They are pale, and may be applied over cream paint and other light tints, but are not suitable for white. As a binding medium for mixing with paint for baths, they are also useful. These are amongst the high-priced varnishes

**SPIRIT VARNISHES.**—These include brown and white spirit varnishes, and patent knotting. Their lustre, surface, and general durability are much inferior to those of oil varnish. They are useful for under-coating quick work, which is afterwards to be finished with oil varnish, but they should not be applied over such varnishes, or over paint which is not simply a priming coat ; for, if they are, cracking is almost sure to ensue. For cheap furniture varnishing, owing to their great spreading capacity, hard drying, and freedom from tack, they are invaluable, as they are also for thinning dry white lead or other pigment, when a quick-drying paint is required for touching up or for coating small articles. On large surfaces such paints should not be applied, as they set too quickly to be satisfactory. To prevent “bleeding,” or striking through of bright red under-coats when they have been coated with a dissimilar paint, an intervening coat of good knotting is serviceable, and where the red cannot be cleaned off, may be recommended. Its use on mantelpieces before painting over Brunswick black, and on knots and other resinous parts in wood, is too well known to require comment here. It is also useful for damp walls.

**FLAT VARNISHES.**—Of these the oil flat varnishes are best, and that termed copal flattening varnish the most durable. Those made with wax, termed encaustic varnishes, are not so workable, and not suitable for washing. These latter may, however, be polished with cloths after application, and in this respect are suitable for oak floors and panelling, as they are then similar to beeswax polish. Both qualities dry with an eggshell gloss, and are well adapted for finishing stained woodwork, especially that of front halls and dining-rooms after the Jacobean style.

**BLACK JAPAN.**—This is a superior black varnish, and is mainly used in carriage painting, but is adapted by the decorator for protecting the back of glass gilding owing to its tenacious nature. It may also be used for fine black finishes, but to add to its durability, it should be varnished afterwards with a good pale elastic varnish. If the varnish is dark, it will have a brownish cast after a time, and may spoil the work.

**BRUNSWICK BLACK.**—Cheap and useful for grates, hot water pipes, and other ironwork, and in glass embossing for coating those parts not to be embossed. As it is of a hard nature, it should never be used over oil paint, especially on places exposed to sunlight or other heat, for its tendency in such cases is to crack. It is sometimes used instead of black japan for protecting glass gilding, but, being brittle and liable to chip easily, it is not properly adapted for this purpose. It may be employed instead of pitch paper for damp walls.

## CHAPTER VIII.

## PRELIMINARIES TO OIL VARNISHING.

**SIZING AND FILLING IN.**—Sometimes in natural wood finishes either of these operations may be gone through previous to varnishing, the former being for cheap, the latter for better class work. In the first case, size is used to stop immoderate absorption of the varnish, hence to save a coat of it by applying a cheaper material; in the second, fillers are used on coarse grained woods as a means of filling the pores, and making the surface smooth at a quicker rate than could possibly be done by, it might be, several coats of varnish. Nothing can be said against this method when properly done, but a similar thing cannot be said of the other. Size from its liability to crack, is at all times risky to use in this connection, and therefore where a permanent job is desired, its use should be discarded. As instructions have already been given in regard to both of these methods, it need only be added that fillers for this particular purpose should be clear in colour and liquid in form—not too thin, of course, but thin enough to penetrate the pores readily. Those made by Messrs. Nobles and Hoare and Messrs. Wm. Harland and Son, are amongst the most useful and economical. On fine grained woods, it may be observed, however, that oil varnish itself is the best material to use from the beginning.

**SIZING WALL-PAPERS.**—Before varnishing paper a protective coating must first be applied, otherwise the varnish would be absorbed by the paper to the complete detriment of the job, rendering even the palest

papers a patchy brown colour. This coating may take the form of glue size, water glass, or other material, but in any case, although one coat of sufficient strength would be quite suitable, it is always advisable to give two so as to make sure of having no parts left undone. Regarding the strength of the materials which may be used for this purpose no exact proportions can be given ; for much depends on the original strength of the materials, and the quality of the paper to be coated. Roughly speaking, though, glue size, the usual medium employed, may be used quite safely in the proportions of one lb. to the gallon of water, more or less water being added according to the porosity of the paper. In any circumstances, whatever strength be adopted for the first coat should be continued for the next. As wall-papers are porous, and do not contract and expand, sizing is in this case quite safe, but to assist the absorbency, the size should be applied warm, yet not hot enough to draw out or injure in any way the colour contained in the paper. Water glass is a little more expensive than glue size, but as it gives the superimposed varnish a greater brilliancy, and is almost colourless, it is recommended for high class work on white and delicate grounds. Its strength should be tested on an odd bit of paper, similar to that hung, before proceeding.

**SPIRIT VARNISHING.**—As a means of saving oil varnish in cheap classes of work, and getting a job quickly completed, this operation is sometimes resorted to. In such cases, the spirit varnish should be thin, and applied direct to the wood. A better material in some respects, though of a somewhat similar nature, is Messrs. Smith and Rodgers' Proof Priming Varnish—a material made specially for undercoating paints and oil varnishes.

**JAPAN GOLD SIZE AND TURPS.**—This mixture may be employed on hurried work of the better class, but compared with oil varnish, the only recommendation it has is that of being suitable for quicker application.



## PAINTING FOR VARNISHING.

PREPARATION OF SURFACES.—Amongst the easiest, and yet the most particular jobs the decorator has to do is that of preparing old painted surfaces which are to be repainted, and finally varnished. Every irregularity, every small blemish, is magnified by the lustrous coating; therefore where the best results are desired great attention must be given to the initial processes. To remove old cracked and blistered paint, the burning-off lamp, or what is preferable, a harmless paint remover, should be used. Removers requiring the use of water should be avoided, as the washing with water not only roughens the wood and raises the grain, but also causes other defects to arise even after the job is finished, such as springing of mouldings, and consequent loosening of the putty around such parts, caused by water having lodged behind them, then drying out afterwards. Apart from this, some days must elapse before painting when the old-fashioned removers have been used, whereas the newer materials admit of the work being proceeded with at once. As these latter materials evaporate rather rapidly, only two or three yards should be done at a time, and as soon as scraped, washed down thoroughly with a rag dipped in turpentine. If the burning-off lamp is used, charring must if possible be avoided, and all mouldings and recessed parts well scraped out, the whole thing being rubbed smooth afterwards with coarse glasspaper. Sometimes if the lamp has not been working effectively, or slight paint ridges have been left through improper handling of it, the necessity arises for rubbing down level with pumice and water, but in such cases, for reasons hinted above, as little water as necessary should be used, applying it with sponges instead of brushes. As the lamp is risky to use for taking paint off window sashes, a shavehook or small pieces of thin glass may be employed, or scraping tools such as are used by cabinetmakers.

Woodwork in good condition, it is obvious, requires much less preparation. A washing and thorough rubbing with lump pumice is, however, always essential to good work, and in treating woodwork in this way, attention must be given to the selection of good pumice, and the method of using it. Hard pumice which has the nature of volcanic ash, and sinks in water should be eschewed, as it does not easily rub the work smooth, and is liable to cause scratching. The whiter and softer stuff is the better quality, and should be used in a circular direction with a plentiful supply of water or soda solution wherever possible. Close to mouldings, small pieces with sharp points and edges are required, and should be used in the direction of, and never at right angles to, such parts. As soon as paint accumulates on the pumice, two pieces should be rubbed against one another to remove it, and afterwards dipped in water to ensure their freedom from grit, as any grit left on the surface will invariably cause scratching when the rubbing is resumed, and scratches, it may be noted, are liable to show through the finished work. To avoid sore finger tips which frequently result when this work is being done, the sides of the pumice where gripped by the fingers should be rubbed smooth.

PREPARATION OF SURFACES, CHEAP WORK.—When good work is not requisite other methods of preparation may be adopted. Cracked work may at once be filled with thick Duresco, Alabastine, or other water paint, and then coated with suitable oil colour. If blisters abound the work may simply get a scraping with a putty or pocket knife, and be thereafter puttied or filled previous to painting. This method, needless to say, has its disadvantages ; for no matter how well cracked paint may be filled, such cracks are sure sooner or later to show through the finished work, and this is especially true where few coats of paint are of necessity given. On the top of the filling a coat of thin spirit varnish may be applied to make the paint bear out

with the fewest number of coats, but this should not be employed on work to be finished white, as in such a case what would be gained by the non-absorption would be lost in opacity ; in other words, an extra coat of white might be required on the spirit varnish to make the work appear white, which would certainly not be an advantage as far as cheapness goes.

**MIXING THE PAINT.**—In making paint for varnish undercoats where a good job is desirable, two things should be noted. First, that the paint be made to dry firm and hard ; second, that the finishing undercoat be non-absorbent ; for if all the undercoats are not of a hard nature cracking of the varnish may result, and if the finishing one be absorbent the varnish will immediately lose more or less of its lustre. After new work has got an oily priming coat, then a next coat of half and half in the usual way, and immediately after old work has been prepared, paint specially suitable for undercoating varnish should be used. Except in exceptional cases such as when first coating old varnished wood, and plenty of time can afterwards be allowed to harden, oil should not be put into this paint. Without doubt the best vehicles for this purpose are Japan gold size and turps or varnish and turps. Either of these combinations prove satisfactory, but pale qualities of varnish and gold size must, of course, be used for mixing white and delicate tints. The proportions of vehicle should be about one-third varnish or gold size to two-thirds of turpentine, and should be continued similarly until the last coat. To make sure of these proportions being similar during each of these coats, it is best to measure the vehicles in a paint pot when mixing ; in any case, care must be exercised not to have a greater proportion of varnish or gold size in the bottom than in the top coatings, otherwise cracking may eventually result. The last coat preceding the varnish should be thinned with half and half, so as to lessen the amount of turpentine, and thus increase the non-absorption of the paint.

All paints for this class of work ought to be strained through fine muslin strainers, as they are then more workable, and easier sandpapered when dry.

NOTE.—As the above is a comparatively expensive paint, the decorator should make his price accordingly. Comparing it with paint mixed in the ordinary way at least twenty-five per cent. additional should be allowed.

PUTTYING AND FILLING.—After a first coat has been given to old work, puttying and filling may be commenced, but in the case of new work only puttying, filling being reserved till the next, or even the next coat again, has dried. Puttying is suitable for nail holes, open joints, and deep dents, while filling is for general irregularities of the surface, including shallow dents and such like which would take too long to putty, and, indeed, cannot be properly puttied. Just before puttying and filling, it is not necessary to sandpaper the work, in fact, better not to ; for in the former instance by rubbing down afterwards any surplus putty above the surface or around the holes is then smoothed down, while in the latter, the slight roughness of the unsandpapered surface gives a better hold to the filling. Putty for deep parts should be used in as stiff a form as possible so that there may be no perceptible shrinkage of it, rendering all such parts slightly beneath the surface, and causing re-puttying. In a similar way, filling should be kept thick for the deep and thinner for shallow parts. In making this composition the proportion of Japan gold size indicated for paint—one-third—to two-thirds of turps should be used in conjunction with dry white lead. Only a little of this ought to be made at a time, and if the mixture sets too quickly to work properly, a little ordinary white lead ground in oil may be added as a restrainer. To prevent difficulties in laying on the filling, it should also be remembered that the dry lead must be thoroughly reduced to powder previous to mixing. In place of making filling, a ready-made

filling may, however, be bought from Messrs. Nobles and Hoare, Harland, or other leading maker of varnishes and allied goods. Taking everything into consideration, these are really cheaper than the workshop compositions, and are strongly advocated for this class of work.

The best tool to use for filling is a paperhanger's scraper. It should be three or four inches broad, slightly flexible, and absolutely straight at the edge to produce good work without extra difficulty. The paste, or filling, being on a clean smooth board or a piece of glass, some of it is lifted with the edge of the scraper, and applied roughly to the work, then trowelled off, as it were, by drawing the knife, now freed from material, straight down the surface at right angles to the wood. A strong even pressure must be applied to the knife, and to avoid ridges in finishing off, it should at each stroke be passed partly over the preceding one. As an alternative to this method, a brush may be employed for applying the composition, but this is not suitable for badly dented work, and is, moreover, much more difficult to sandpaper down. In the case of mouldings, round, or carved work requiring filling, this latter way is, however, the best.

In puttying little difficulty will be experienced if due attention is given to the operation, but given it must be. Besides a putty knife, a small tool in the form of a strip of hard wood about an inch in breadth, and an eighth of that in thickness, is essential. One end should be cut at an angle like a putty knife, which cutting makes it the most suitable instrument for squeezing putty in around open mouldings, skirtings, and so on; for in doing so with other tools, scratching and other damage is liable to occur. Putty for this class of work should be made with white lead stiffened with whiting, and coloured or otherwise to suit the ground it is being applied on.

These operations having been so far completed, and the result properly hardened, a thorough rubbing

with sandpaper or pumice should be given. If the filling has set extra hard, the latter material or artificial pumice blocks should be used in conjunction with a sponge and water as in usual first preparatory work. After the rubbing has been done by whichever method, if inequalities are still in the work, filling must again be resumed with its consequent after rubbing until a surface as smooth to the touch and level to the eye as glass has been obtained. In some cases one filling operation will suffice, while in others, even three are not sufficient, a greater or fewer number being required for particular parts.

APPLICATION OF PAINT.—In applying the paint, whether it be coats previous to, or after the filling operation, similar principles are involved. The criterion of good plain painting is that it be quite free from brush marks—that you cannot say whether it has been finished or brushed off in one direction or another—that it is, in fact, like a sheet of plain texture paper. To attain this end, well made paint, good tools, and above all, skill is necessary. In regard to the first, it should be mixed as already indicated, and in consistency is best like medium thick cream. As for the tools, they should consist of large brush, sashtool, and fitch, and should be of sufficient length and flexibility for laying off after the paint has been spread, and yet must not be soft and flabby, for with such tools it is difficult to distribute the paint evenly—and spreading is also an essential element in good work. Needless to say, the bristles of each tool should be cut and arranged so that they readily spread out into a fine chisel-like point when required.

Coming to skill, craftsmanship, art, or whatever you care to term it, there is no royal road except by practice and a sensitive touch. By the latter phrase is meant that lightness of touch which distinguishes one man from another when applying a brush to a given surface—that difference in lightness of pressure when gliding a brush over a paint film. In painting a panel,

the paint must be distributed evenly. To do so, each brushful of paint should be rubbed out to a thin film, by leaning on the brush with some pressure, applying the material firstly up and down, then crossways, and eventually downwards with an even sweep. This being so far done, the brush should be thoroughly scraped free from paint on the edge of the kettle, then glided across the work as lightly as possible, and finally brought downwards in a similar manner. In sweeping downwards from the top mouldings of a panel sometimes the paint "gathers," or becomes thicker close to the bottom ones. To remedy this, the fitch may be swept lightly in towards the moulding at that point, or as is often needful outwards from the moulding towards the body of the panel. Close to the top mouldings, again, a bareness may occur which may require to be softened upwards. When these operations have been properly executed, painting of a smooth, unbrushmarked texture should result.

The number of applications will vary in different cases, but painting should be continued always until an appearance of solidity has been gained. In many cases, and especially when doing white work, six or seven coats are not too much, sometimes, indeed, on special jobs, ten are required, the last two being made from oxide of zinc instead of white lead. Between each of the coats at least two days should elapse, and a thorough sandpapering be given.

## CHAPTER IX.

## PRELIMINARIES TO OIL VARNISHING

(continued).

The preparatory work and painting having been finished, the next essential is that of sandpapering for varnishing. In the case of good work, this should be done at least a day previous to varnishing so as to allow the film thus exposed to the air to harden still further, and to allow the dust of the rubbed off particles to settle. If the sandpapering has been done in a thorough manner between the various coats, little rubbing should now be required, a piece of No. 0 or fine No. 1 glasspaper being used for the purpose. One of the chief points in this operation is to avoid rubbing the paint off the sharp edges of the woodwork, otherwise touching up may have to be done which retards, and eventually may mar the finished work. After this, if the work has many deep mouldings and recessed parts, it is sometimes advisable to swill the whole thing down with cold water, as this operation, besides removing loose particles difficult to remove with the duster, helps to some extent to harden the surface. This makes the woodwork almost ready for the application of varnish, but before that operation can commence some other matters require attention. Such include the condition of the floor, the quality and condition of tools, the kind of vessel used, the cleanliness of the worker, and the general atmospheric conditions. Taking them in order, we have to consider :—

**THE FLOOR.**—Of the utmost importance is a clean floor. This should be thoroughly scrubbed immediately



after the final rubbing down of the paint, so that it may be quite dry for the following day, as the effect of a damp floor on the atmosphere of a room on the day varnishing is taking place might lead to blooming, or loss of lustre, in a delicate varnish. That portion of the floor close to the skirting should if possible be done with a sponge, as that cleanser will not mark the skirting as a scrubbing brush might, nor leave streaks of wool as some cloths are liable to do.

BRUSHES.—For good work these must neither be hard nor short. Other things being equal, the oval and flat shaped brushes are the handiest to work with. The bristles should be of good medium length, flexible, and tapering to a chisel-like point, otherwise it is difficult to lay on the flowing coat so necessary to good, and especially good one-coat, work. In addition to a brush, sashtool, and fitch, a small hog's hair tool or "wiper," is necessary. This latter is useful for taking any superfluous varnish from mouldings and quirks where some is, of course, always liable to gather soon after the flowing out commences. The most important thing, though, in connection with brushes is that they be free from dust or grit of any kind. Owing to this, each brush should be scraped round the outside base of the bristles to remove any hard varnish which may be adhering there, but which might readily come off to the detriment of the varnishing if allowed to remain. Afterwards they should be well washed in turpentine by dipping and squeezing in a small pot half full of that material, then finally pressing the turps from them by squeezing between clean paper—not rubbing them on paper as is frequently done to the injury of the cleanliness. This washing should take place only a short time before the brushes are to be used, but if it happens they are not required immediately, they should at once be suspended in clean linseed oil either by putting a wire through their handles or using a patent brush-holder, and then covered with a proper cover or one of clean paper shaped to suit the containing vessel.

POTS.—Putting patent varnish cans to the side, there can be no doubt that the stoneware pots with side handles are the best. Owing to their smooth inner surface, and freedom from quirks caused by joinings in iron pots, they can be much more effectively cleaned than the latter kind, and, having a side handle, in all cases prevent any dangling of the hand over the pot—frequently a source of trouble. As their edges are comparatively blunt, there is also little danger of scraping anything off the brush during the progress of the work in event of the brush not having been cleaned thoroughly with the pen knife. When such pots are not to be had, a small, thin-lipped jelly mug forms an excellent substitute. Having no handle, it should be held by the bottom during work.

CLEANLINESS OF THE WORKER.—To gain the best results, the operator's hands and clothes should be as clean as possible. Overalls which have been in use when washing off distemper, and are still dirty, should on no account be on. Aprons, too, clean or unclean, should in this connection be discarded, as their liability to flap about, and raise dust is not at all consistent with clean work. The most suitable thing to wear is a clean white jacket of a size adapted to the worker. If the sleeves are too long, they should be turned up an inch or two so as to allow perfect freedom in working, and to avoid flapping during the progress of the work, the jacket should be buttoned. Clean soft slippers should also be worn, and great care taken to move about as quietly as possible. Just before commencing, too, the hands should be well washed so as to ensure their freedom from any dirt or grit that might otherwise fall from them into the varnish. The craftsman must also exercise cleanliness in regard to his step ladder, washing it previous to using, and taking heed to move it about very cautiously.

ATMOSPHERIC CONDITIONS.—For weal or woe in varnishing these play a prominent part. As aids to the full measure of success, a dustless atmosphere and a

warm temperature are essential, but it may be said that the first never exists, and that the second can seldom be had to suit ; therefore precautions must be taken accordingly. Such precautions consist in having the floor washed, and moving about with caution, as already mentioned, and also in having some clean newspaper tucked in at the outside bottom of the door so as to prevent the entrance of more dust. As atmospheric dust is continually falling to the floor, part of it to be raised again by currents of air or the feet, a good plan is to slightly damp with a wet sponge that portion of the floor on which the feet will be placed when doing a certain piece of work—close to a door, for example, or within the bay of a window. In regard to the control of temperature, however, little can be done. The only proper aid towards a uniform temperature in this connection is that of a radiator. If there is one in the room under treatment, and the atmospheric warmth is insufficient for the easy working, and due setting, of the varnish, the apartment should be heated at a uniform rate for several hours, and at least until the varnish is beginning to dry. A temperature of 65 degrees, it may be mentioned, is the most suitable for the purpose. If the temperature is too low fogging and blooming may result, while if it is too high, the varnish loses in body, and becomes less elastic, besides setting too quickly to allow of proper working on large surfaces. Whether the temperature be high, medium, or low, uniformity should, at any rate, be aimed at ; for even a damp, but uniform temperature is not, after all, usually detrimental to successful varnishing, whereas a sudden dampness or chillness occurring before the work has dried may be. Defects from these latter causes are more liable to happen on staircase, hall, and exterior woodwork, but in any case, open doors, windows, or anything likely to cause draughts of cold or damp air should be avoided.

DUSTING.—Previous to application of varnish, all the woodwork should be thoroughly dusted. This,

though a simple operation, is of the utmost importance ; for upon it depends to a great extent the cleanliness of the finished work. For the best results two dusters are necessary—one for the preliminary, the other for the final, dusting. As the first dust down is liable to make a brush dirty with dust particles, more especially when dusting low parts such as skirtings, it is advisable to have a second one not only to ensure the complete removal of any trace of dust, but also to prevent dirtying the work—which, by the way, is particularly necessary when dusting white or delicate tints of paint for varnishing. Needless to say, both brushes must be well washed in soap and water and thoroughly dried before commencing the operation, and after it has been finished, sufficient time should elapse to allow any dust to settle previous to varnishing.

## CHAPTER X.

APPLICATION OF OIL, SPIRIT, AND  
FLAT VARNISHES.

## OIL VARNISH.

To make this operation a success, the first essential is to take the varnish flask into the apartment where the work is to be done ; for by doing this, little quantities of varnish may be taken out at a time instead of having, say, a potful to begin with, which is almost sure to become dirty before it is emptied. Sufficient varnish should be put into the pot so that the brush tips may not touch the bottom, yet care must be taken to put in little more than will suffice for a certain part of the work. In regard to lifting the varnish from the pot another precaution is necessary. This consists in carefully dipping the brush into the varnish, giving it a twirl so as to hold the material properly—not slapping it against the pot side, which simply causes dust, but lifting it straight on to the work. This having been attended to, the varnish should at once be spread with an up and down stroke, then crossed with a slight pressure, and finally finished off downwards or upwards—in the one direction at any rate. Before giving the finishing strokes, the brush should be scraped free of varnish against the edge of the pot so that no surplus material may ooze from it when placed on the work, and so that the toes may be brought to a fine point more suited for finishing with. As varnish in itself flows to a level surface, the main point is to be sure that it is equally spread ; for as runs are caused by more varnish being on one part than another, it follows that

equal spreading is a preventative of running. Generally varnish should not be crossed more than twice, and the less crossed, or, indeed, brushed at all, the better. The heavier the coat, the more brushing will varnish stand, but for a perfect flow and clean finish, quick application is essential.

The quantity put on should vary with the number of the coat. Thus a first coat on bare wood may be full, as much of it will be absorbed, other undercoatings on similar work or on paint should only be medium in quantity, so as to allow of proper hardening and easy sandpapering, while the last coat in every case of brush finishing should be applied full and flowing. At the same time, too much must not be put on at the last coating ; for besides increasing the risk of runs, a loss of lustre may eventually occur through imperfect drying of the varnish. After a door or window shutter has been coated for about half an hour, the mouldings should be examined, and any surplus varnish there collected wiped out with the small tool, or wiping fitch. This is always necessary when a flowing coat has been applied, and especially with a slow setting varnish.

Besides the care bestowed on, and manner of, applying the material, the method of procedure is also of importance. It is best always to do the hidden parts of doors and windows first when working at such places. Thus in doing a window, the check ought to receive first attention, then the architrave, and finally the shutters, the sill not being touched until mantelpiece top and skirting are being done, as they ought to be, at the end. In doing a door if the work is turning out in the least specky, the main panels should be left to the last, the stiles, as well as the architrave, being done previously. In such cases the mouldings are finished with the panel, but, unless with very quick setting varnish, not until every panel of importance is coated. This method keeps the sashtool clean and fit to be used on the panels if necessary, whereas by coating each set of mouldings immediately after each panel is

done, there is always a risk of the sashtool becoming dirty, and unfit for the plain surfaces, and, it should be noted, that for putting a good coat on small panels this is the best tool, and therefore often required.

VARNISHING NATURAL OR STAINED WOOD.—These sometimes receive additional treatment by the process of double coating. This consists in applying another coat immediately after the under one is dry, and while it is still tacky. No rubbing down must be done, and the greatest care taken to prevent the working up of the preceding coat. Though this method lends additional brilliancy to the work, it is not generally to be recommended where an extra clean finish is desired, and is unsuitable for white or light painted work.

VARNISHING WHITE PAINT.—More difficulty is experienced in this than any other class of varnishing. In order to prevent the yellowness which sometimes occurs at junctions of stiles and so on, the material should be applied as quickly as possible. When such clouding, or yellowness, does happen, the best plan is to let it alone, and, if it does not bleach as clear as the other parts in a day or two, to paint that part in again. In any case, too much reliance should not be placed on the bleaching process, as with some bleaching varnishes, the yellow appearance will return after a time. At tops and bottoms of panels, the difficulty of giving a uniform coat is sometimes experienced. As the drawing down or up of the brush from such parts leaves a bareness very perceptible on white work, the large fitch almost devoid of varnish should be swept lightly across them, and if by so doing a running tendency is caused it should be softened off into the body of the varnish.

VARNISHING WALL-PAPERS.—In treating these, the main thing is to work quickly to prevent clouding, and to apply each brushful close to the preceding one so that the coat given may be uniform. To put one brushful on, then another two or three inches farther along the wall, and join them by crossing is not at all conducive

to an equal glossiness. The spaces between are usually more or less bare at the finish by such a method.

VARNISHING EXTERIOR WORK.—In winter time this should be done immediately after the sun has struck the work for a short time, and if in a position where the sun's rays cannot strike, not before ten in the morning. In the summer time, again, it should be done sufficiently early so as to allow of the varnish being set by night fall. Sometimes under certain atmospheric conditions an outside varnish sets quicker than it can properly be applied. To remedy this, a little boiled oil may be mixed thoroughly with the varnish although it is better to use if possible another and slower setting varnish.

VARNISHING FURNITURE.—The precaution to be attended to here, is to give three thin coats rather than two heavy ones. Thick coatings on bottoms of chairs and tops of tables are liable to become tacky under pressure.

#### APPLICATION OF SPIRIT VARNISH.

So long as the stretch can be kept well in hand, the joinings not having time to set, there is no difficulty in this operation. As spirit varnish is easily spread, and has no tendency to run, not more than one crossing is necessary, and in many cases it will be found that the up and down application is in itself best. If put on quickly, as indicated, it dries free from brushmarks, and, apart from difference in the wood, of a uniform appearance. Being much thinner than oil varnish, flowing coats cannot be applied.

#### APPLICATION OF FLAT VARNISH.

The foregoing instructions apply also to this material. It must be laid on at once, and not worked, otherwise flashing or glossy marks will result. In doing the stiles of a door each stile must be cut in separately or the whole brought down at once. In



working down a four panelled door, the following order would be adopted, middle upright stile, top rail, outside stiles to lock rail, lock rail, outside stiles and middle upright bottom stile to bottom rail, then bottom rail. It is simply a matter of completing the top half, then the bottom. If possible the wax flat varnishes should not be used in a humid atmosphere, as they are liable then to turn out white or bluish looking; the oil quality may, however, be used at any time, and some of them outside as well as inside.

## CHAPTER XI.

## FELTING DOWN AND HAND POLISHING.

When the highest possible class of varnish finish is desired, these operations have to be gone through. The first makes the surface smooth, of a dull lustre, and in itself constitutes a fine durable finish, but is mostly used as a leveller between coats in superior brush finishing, and between coats, and after the final coat to form a suitable ground for hand polishing. This last process gives a high lustre to felted work, making surfaces as bright and easily kept as French polish does, and in the furniture trade is much employed in superior piano finishing. When properly done, it is the painter's only process which can at all be compared with plate glass for cleanness of surface—the finest brush finishing of varnish being much inferior.

THE GROUND WORK.—Felting and polishing may be executed on varnish work of every description so long as the woodwork is good or may be made good by filling and so on—work varnished from the bare wood upwards, stained and varnished or painted and varnished—the essential thing being that it has had enough varnish previous to the final felting. On bare wood four coats are necessary, on stained three, on painted two; in fact, more coats may be given, the precise number depending on the skin or body arrived at, and its freedom from speckiness. In every case, previous to commencing painting, staining or varnishing, and during the progress of the work, preparatory operations of the highest class must be gone through,

and in regard to the varnishing, care taken to do it as cleanly as possible. This last precaution is necessary ; for though felting may remove some dust particles effectively, it is sure to cut those deeply seated into so many dull specks which mar the felted surface, and cannot be polished satisfactorily. Whether the work is to be finished simply by felting, or by the additional operation of polishing, the best results are always obtained by felting down between each coat instead of sandpapering. Such should be done after each coat has thoroughly hardened so as to avoid the risk of scratching or of rubbing the pumice powder into the varnish—defects which not infrequently occur when rubbing on a soft or imperfectly hardened surface. Unless a special polishing varnish, specified by the makers for that purpose, has been used, a week should at least elapse before felting ; much depends on the hardening qualities of the varnish, and the drying power of the atmosphere at that particular time. In the case of work that is not of the highest class, rubbing down with glasspaper between coats until the second last one or, indeed, the last one may suffice, as it is much quicker and cheaper. The last coat must, of course, always be felted down previous to varnished work being polished. Besides forming a ground for these operations by specially varnishing, old varnished woodwork in good condition may be used for the same purpose, but as such has not generally been expressly varnished for a polished finish, it is usually better to treat it by felting only.

**MATERIALS.**—These consist of pumice powder, a sponge, chamois skin, and an inch or two of felt, but paraffin oil and cotton rags may also be added. The felt should be in the form of a thick pad so that it may be held easily by the fingers when rubbing. For convenience it is better to purchase two or three ready made pads having curved wood handles somewhat similar to those of papering brushes, though much smaller, and to use plain cut pieces of felt for all

mouldings and recessed parts. In addition to these, putty powder or rotten stone, linseed oil, and flour are required for polishing.

FELTING.—Having the materials at hand, the pumice powder being in a tin saucer, the work is commenced by damping a part of the surface with a sponge which has been dipped in clean cold water, then damping the face of the felt or pad, dipping it into the pumice, and applying it to the work. If in the preliminary damping, the water cisses badly, it is advisable to make it slightly soapy by dissolving in it a very little of good quality white soap, as this makes it lie, and lessens the risk of scratching. The rubbing should be done with a slight up and down or circular motion, taking care not to rub harder and longer at one part than another, and sponging frequently to note the progress of the work, and to ensure against cutting through the ground, which cutting would be irremediable except by varnishing. After such sponging and drying with the chamois, the rubbing is again continued until a uniformly dull surface is obtained. This similarity of appearance applies to all parts, and to obtain it and a perfectly smooth surface should be the chief desideratum if the felting is to be called good. When the work is deemed sufficiently well cut, it should be thoroughly washed down with a brush, as such cleans out the mouldings best, then sponged with a clean sponge, if possible, not the one used for the former sponging, as it is liable to be gritty. These final washings, it need hardly be said, are of much importance; for if improperly done, specks due to minute pumice particles left on the surface are sure to appear on the finished work if it be afterwards varnished or polished. Sometimes it is a good plan to use two grades of pumice powder, a coarse and a fine, but generally it is only necessary and, indeed, only beneficial, in the case of old varnished woodwork which, being very hard, requires a coarser grade to cut it down quickly before applying the finer quality to

obtain the needful smoothness. When the two qualities are used two different felting pads are necessary to good work.

Felting may also be done by using paraffin oil, pumice, and cloths instead of water, sponge, and chamois. A little paraffin oil is placed in an ordinary paint pot, then applied to the work with a sashtool, and rubbed with felt and pumice as already mentioned. To note the progress of the work, the surface is now and again wiped with a rag dipped in the oil, and dried with another. At the finish the work is thoroughly washed down with paraffin, and afterwards rubbed with cotton cloth free from fluff, and if found necessary a day or two after washed with soapy water, and finished off with a sponge, clean water, and chamois. This method is very suitable for semi-gloss finishes, but is not so well adapted for forming a ground for the highest class of polished finish. Its great advantage lies in its giving a uniform appearance quicker than the other method does, but it does not cut and reduce to smoothness any sooner. If anything, it is better employed on old varnished woodwork than on new.

POLISHING.—If the ground work has been properly brought up, and the final felting well done, there should be little bother with this operation. The rubbing is conducted as before, water or linseed oil with putty powder or with rotten stone being used lightly over the surface with a special pad kept for the purpose so as to ensure freedom from extraneous matter which might adhere to it in the form of pumice particles had it been used in the preceding operations. This pad should be of clean soft calico formed into a loose ball so as to be easily gripped. It is dipped into linseed oil or water, then into powdered rotten stone, and applied lightly until a sufficient polish has been obtained, after which, if oil has been used, a tuft of cotton wool sprinkled with fine wheaten flour is rubbed over the work to remove that material, and give the final polish. When water has been used, the powder will usually rub quite dry,

and almost, if not quite, fall off, but in any case the work should finally be washed down with a sponge. When choosing between the use of oil and water, and between putty powder and rotten stone, it is always preferable to use putty powder and water for white or light tinted woodwork, and the rotten stone and oil for dark. If these latter have been used for white wood, it is advisable to give the surface a final rub with a soft rag dipped in spirits of wine so as to remove any trace of the oil which might discolour the work.

Another, and simpler method of polishing, though not so good, is to rub the felted ground with a mixture of sweet oil and spirits of wine until a polish is obtained.

## CHAPTER XII.

DEFECTS IN OIL, SPIRIT, AND FLAT  
VARNISHED WORK.

To some extent these have already been spoken of, and if the instructions already given in regard to the bringing up of work, the kind and quality of varnish employed, and the application thereof, there should be little risk of any defect arising. However, as defects do occur even after every precaution seems to have been taken, a list of the usual defects with their causes may not be out of place.

Defects spring from various sources but may finally be reduced to at most five classes, viz. : those due to the worker, to the surface varnished, to the atmospheric condition as regards dust, to the temperature of the air, and to the varnish used. In very poorly executed cheap work, all these classes of defects may be visible, while in good work only those classes which are for the most part beyond control, such as those due to temperature and to other atmospheric conditions, are likely to occur. Thus we have :—

GRITTIENESS.—This defect falls mainly under the class due to the worker, and is mostly caused by unclean brushes or improperly dusted surfaces. Dirty paint cans are also frequent sources of grit, as is also felted work from which the powder pumice has been improperly washed previous to varnishing. All these are under the control of the worker, and may generally be avoided, but others are partly beyond control. Such are grittiness due to dust in the air, and specks or

particles in the varnish itself. When newly opened varnish exhibits this defect, it is due to improper methods of manufacture, insufficient straining, want of maturity, or storage in dirty cans. If the tin has been opened for some time, and a quantity been used, it may be caused by the air contained in it drying and skinning the material, hence rendering it full of particles when required for use. Varnish left over from use and returned to the remainder in the tin is likewise a source of this trouble. Sandpapering and revarnishing is the only remedy.

CISSING.—Varnish cisses or curls up here and there from the ground on which it has been applied when the surface is greasy or, whether paint or varnish, contains too much terebine or when it is hard and glossy. If the ground is oily, as in working over oil paint, or the varnish contain rosin or other deleterious material, this trouble may result. To prevent this, the bringing up of the work and the quality of varnish must be attended to, but as it is too late to alter these when cissing does occur, the preventative is to sandpaper the work well, and give it a thorough rubbing with a damp chamois.

PITTING OR PINHOLING.—This trouble takes the form of small pits, or, as it were, pinholes in the varnish, and is sometimes caused by the under surface being greasy, but generally by atmospheric air being mixed with the varnish—a thing which not infrequently occurs when varnish has been shaken violently on the road to a job, as, for example, when being carried on a bicycle. As soon as the defect appears, the varnishing should be stopped until due time has been allowed for the varnish to settle, and let loose the air contained within it. When the defect happens without any shaking having taken place, it may be due to the varnish having absorbed a certain amount of air when being filled into the tin by the makers, and may be remedied by allowing the tin to stand without a cork for a short time



**BLOOMING.**—This may be caused by the varnish having been imperfectly boiled or otherwise badly made, then being exposed to the action of damp air during the drying process. It happens mainly on exterior work, and in new houses where there is much plaster drying, and as it is liable to occur even with high grade varnishes, the precautions already given should be noted. Owing to the power of iron surfaces in condensing vapour, such surfaces are very liable to this defect, and should only be varnished in warm weather.

**TACKINESS.**—The trouble here may be due to a cheap varnish containing rosin oil, but is more frequently caused by uncleanness of the surface coated, and by coating a surface only apparently hard, not in reality thoroughly so. An excess of driers, whether in stain, paint, or varnish, is usually the cause of this false hardening, and should be avoided in every case. It is also caused by tampering with the varnish, adding linseed oil, or another and quite different kind of varnish. Exterior varnishes of much elasticity when used indoors are liable to become tacky under great heat or warm hand pressure. Sometimes excessive cold during varnishing produces this defect. To cure any form of tackiness, except that due to a dirty surface, it is necessary to give a thick coat of whiting or other distemper colour mixed only with water, and to allow it to lie for a day or two so as to absorb the cause of the tackiness, after which it should be washed off thoroughly, and revarnished. When dirtiness or greasiness under the stain or paint coatings which have preceded the varnish, is the cause, a thorough cleaning off with paint remover is usually required; therefore to lessen the risk of this defect all work such as church seats and furniture should be well cleaned at the commencement, and care taken that the remover is thoroughly washed off, as it in itself, if not properly cleaned off, sometimes causes tackiness.

**CRACKING.**—This defect usually happens after the lapse of some time—it may be one year or several—and

is not infrequently caused by having used strong glue size under the varnish, by placing a hard drying varnish over an elastic one, or by having used too much terebine or Japan gold size in the under coats, or by having applied varnish over an undercoat not thoroughly hard. These are the chief technical causes, but it should be noted that these are only part causes acting in conjunction with others, such as changes of temperature, moist air, heated air, and the direct rays of the sun, or of a fire. If it were possible to have a uniform temperature always and the same amount of moisture in the air always, this trouble would be avoided, but as this is impossible, the technical causes must be attended to at the commencement of the work. Sometimes varnish which has been applied in too hot an atmosphere will afterwards crack, owing to its elasticity having been lost thereby. Cracking also results from having applied thick coats of varnish in very cold weather, but this like the last-mentioned cause, is not usually much in evidence.

WRINKLING.—The trouble here referred to happens immediately after the coating has dried, and is caused by too heavy an application which goes into wrinkles, or heights and hollows by the action of drying. The preventative is obvious; the remedy cleaning off, and revarnishing.

RUNNING.—Of the faults due to hurried work, this is one of the commonest, and then consists in not having spread the varnish properly, or, in other words, equally over the surface, or in not having wiped any surplus varnish from the mouldings or recessed parts. When not caused in this way, it is simply due to too heavy a coating, or to a rise in temperature affecting the varnish, as, for instance, when a varnish has been chilled in the tin during excessive cold, is applied to work, and afterwards whilst drying is struck by the sun's rays. In regard to this defect much depends on the setting properly of the varnish; those setting slowly require much more care than those which set

quickly. While varnish is flowing wet a little extra working will eradicate runs, but when once it has dried treatment is difficult. In bad cases it is always better to clean off the coat of varnish containing them either by scraping or by rubbing with a clean cotton rag dipped in benzine. In other cases, sandpapering or rubbing down with ground pumice may suffice, but care must be taken that the work is thoroughly hard before doing either of these or revarnishing.

ROPINESS.—Another defect mostly due, but not wholly, to workmanship. If the varnish is worked too long, it sets during the operation, and, in consequence, does not flow out level, that is, becomes ropy. To obviate this quick application is necessary if the varnish be a quick setting one. Sometimes the varnish itself is the main cause of the defect, not allowing enough time for application, owing to its having become thick by lying in a half empty tin. In such cases heating in a can of hot water, and adding a very little pale boiled oil, does good, but this latter is not advised if the varnish is at all workable.

YELLOWING.—This defect is mainly visible when white or other delicately tinted work has been varnished. In the cases of white and cream grounds, it is often caused by an excess of driers, oil, or dark varnish in the paint, but is often the result of the varnish itself being defective, or of an inferior grade. In dark rooms this trouble is most prevalent, as the mere absence of light darkens the majority of pale varnishes. To lessen the risk of this happening, the best varnish for the purpose under consideration must only be used, and the last coat of paint must be mixed with a very pale varnish, the pigment employed being, if possible, oxide of zinc instead of white lead. Where a pure white is desired, it is, of course, advisable to use white enamel, as even the palest varnish has a creamy tint, and if it were otherwise—if the varnish were water clear, it would be at the sacrifice of durability.

LOSS OF LUSTRE.—When this is not caused by time or by blooming, it is caused by a too absorbent ground, the varnish having been rubbed out too much, the use of an inferior and cheap varnish, or the result of coating a surface not thoroughly hardened. To prevent this, the reverse order of things is only necessary, and to rectify it, a good coat of fine quality varnish.

TURNING BLUE.—In general this occurs on outside doors, and is not to be confounded with blooming, which latter, besides having a “bloom” or bluish appearance, has also a lack of lustre. It is a trouble which happens after rain, and is caused by the varnish absorbing the water, and may appear in the form of spots, streaks, or a general blueness. Being always inherent in the varnish, this defect cannot very well be avoided by the decorator, but as it is much more apparent on some grounds, notably those of brown and dark green colours, it may be rendered invisible to a certain extent by employing lighter undercoats. As varnishes vary, however, in respect to this liability to turn blue, the better resisting ones may be discovered by varnishing several panels with different varnishes, and after they have dried thoroughly, laying a wet sponge on each overnight to see the effect produced next morning. Such a test is surprising, for it will often be found that some of the most expensive varnishes are the worst sinners in this respect. In very wet parts of the country, the use of boatbuilders’ copal, if of good quality, will frequently obviate this trouble, and may be recommended.

SILKINESS.—This fault is simply a form of very fine cracking which can only be detected properly by a magnifying glass, though it is nevertheless, visible to the naked eye as a defect. Its causes are similar to those treated under “cracking,” the application of one coat of varnish over another not properly hardened being probably the chief source of the trouble. Black Japan undercoatings also sometimes give rise to this, owing to a change they effect in the varnish. The

remedy is to felt down, and revarnish, but such can only be done with success after the work has stood for a considerable time, and then an elastic varnish only should be used.

PEELING.—This happens through time to varnish which has been applied over glass, and exposed to the changes of temperature, but in other cases is mainly due to the employment of a very inferior class of varnish, in fact, one adulterated to a large extent with rosin. Thorough removal of the defective varnish, with after repainting and varnishing is the only remedy.

### DEFECTS IN SPIRIT VARNISHED WORK.

CRACKING.—Often this is due to the wood expanding more than the varnish, and often to the varnish having been applied over an oil varnish, oil paint, or other elastic coating. There is no proper remedy except that embracing removal of the coatings.

CHIPPING.—This is mostly due to the lack of “key” given by certain hard woods to this class of varnish, and cannot well be obviated. Thick spirit varnish is, however, much more liable to this defect than thin qualities ; therefore these latter should only be used, especially in first coating.

### DEFECTS IN FLAT VARNISHED WORK.

FLASHING.—This is the commonest fault, and is usually due to working the varnish too long. When it is due to the material itself, a slight heating sometimes does good. It must be remembered too that to give the best results, the finishing coat must be applied on a non-absorbent ground, whether of its own nature, oil varnish, stain, or paint.

TURNING WHITE.—Moist air in conjunction with a varnish composed largely of beeswax is the source of this, and with such varnishes can only be avoided by selecting suitable weather in which to do the work, or by having the air of the apartments worked in sufficiently heated.

## CHAPTER XIII.

## ENAMELS AND THEIR PROPERTIES.

Enamels are divided into two classes, flat and glossy, the former embracing ordinary flat enamels and those which may be stoved, the latter embracing bath, stoving, flamboyant, petrifying, and ordinary enamels. This class, though somewhat similar in nature to gloss varnishes, has, nevertheless, several points of difference, and therefore requires different criteria from those. With the exception of the flamboyant division, all gloss enamels should include the following properties to give successful results:—

LUSTRE.—This should be high and of a permanent nature. An enamel which is quite glossy on application may lose much of its brightness during the drying process ; therefore, judgment should not be passed in regard to this until at least three days after, when the film will have hardened. To gain reliable information, it is then best to compare the enamelled surface with a small piece of similarly painted and freshly enamelled wood. A better plan still, as the surface worked on is sure to be uniform in each case, is to enamel a piece of glass, allow it to harden, then enamel another piece, and whilst wet compare results. Any difference in lustre will at once be detected by this method. In finding the relative gloss of enamels, it is best to employ the actual conditions under which they are applied. As the lustre of some enamels vary but little whether applied to paint or to glass, and that of others vary much,

comparative tests should be made on identically painted wood, and at the same time. The permanence of gloss, again, is very much a question of time, yet a fair index to this may be gained by exposing the above boards outside for a few weeks, or for two or three days at an equal distance from the heat of a fire, and for the same number of nights outside.

**FLOWING PROPERTY.**—This is one of the most important qualities in a good enamel. Immediately after application, it should, like water, seek its own level, and flow out to a smooth, mirror-like surface. Where work is to be of the highest class, a slight loss of lustre may be passed when the lack of this quality will not. Enamels defective in this respect, needless to say, do not give an enamel-like surface, even though they may be quite glossy, and much labour may have been spent on bringing up the groundwork suitably ; therefore, every enamel not already well known should be tested for this. By bringing up a board specially for enamel work, then applying the material to it in all directions until sufficient time has elapsed to allow of doing a large panel, a satisfactory clue is arrived at. If it is defective the brush marks will be visible as so many ridges, and if very bad, such ridges will not only be visible, but will be felt plainly by moving the fingers across them when dry. Glass is sometimes used for testing this quality, but as such is not the material generally to be enamelled, such tests are usually futile for practical purposes. Some enamels flow out to perfection on glass, and yet will not do so on painted wood—no matter how smooth. As a comparative test for flamboyant enamels, the glass method is, of course, satisfactory.

**PURITY OF COLOUR.**—This applies to the most used of all enamels—white ones. A pure white should not perceptibly incline to yellow nor to blue, and yet, owing to the nature of things, such is not to be had in paint ; therefore, the decorator should compare enamels to see which is purest in regard to



this. This should not be done by comparing the colour of each in bulk, as the colour then varies more or less according to the density of the material, but should be noted by actually applying some of each to an oxide of zinc ground—which gives a much purer white than white lead, thus enabling judgment to be passed more easily. When a seemingly pure white cannot be obtained, it is advisable to choose the yellowish cast, as it is not so cold nor so grey looking when in juxtaposition with other tints, such as deep red wallpapers, and so on, as the bluish cast is. Generally clients prefer it, but it should be observed that it has one drawback. In rooms where there is little light it is usually more liable to become yellow, to lose its whiteness, than the other used under identical circumstances. It, however, tints to a prettier cream than does the latter, and where much tinting of enamel is resorted to, it is recommended. To find the changes of colour which an enamel is subject to, whether under the influence of light or shade, it is simply necessary to coat two similarly painted pieces of wood with the material, and to expose one to the light of a window and the other to the darkness of a drawer or cupboard, then after a month or two to enamel a third bit of wood, and compare with the others.

OPACITY.—The body, or opacity, of an enamel is due to the amount and quality of the pigment employed in its manufacture, and is easily found by noting whether the material will cover a given surface so as to render it completely invisible. In these days this quality is very important, especially in connection with white work, as the number of coats of paint given previous to enamelling is usually inadequate in all but the best class of work. Even though a sufficient number of coats has been given, if the finishing one has been of white lead, this quality of good body is still necessary, owing to the enamel white and the lead white being so diverse in colour.

In coloured work, a match of the enamel colour may be made, and the difficulty thus obviated, but in white work this can only be done by giving a sufficient number of coats of paint, and finishing with oxide of zinc instead of lead. In testing the hiding power of different makers' white enamel it is a good plan to apply them on a pink ground, as then any difference is readily detected.

EASE OF APPLICATION.—This property might be taken as identical with that of flowing, but it is not really so. As a matter of experience, an enamel may flow quite well, and yet be difficult to apply. Unless under the most favourable atmospheric conditions—a thing not to be reckoned on in ordinary house decorating—some enamels are tough, viscid, and difficult to spread, and in consequence cause much loss of time. The decorator may certainly “doctor” such an enamel, but that is not the point; an enamel should not require such treatment. The ideal material in this respect is one which, though slightly tough, does not drag or feel unusually difficult to apply evenly, and has the power of sticking to where it is placed, thus lessening the liability of running. All enamels, of course, have a certain amount of toughness; indeed, it is so far essential to their durability, but when toughness interferes with application that particular enamel is to that extent defective.

DRYING POWER.—This is a more important property than it seems to be. Enamels which set and dry quickly are liable to lose their lustre somewhat rapidly, while those which dry too slowly are liable to become specky owing to atmospheric and other dust. The best enamel for practical purposes is, therefore, one between the two—one which dries but is not thoroughly hard in twenty-four hours. As far as hardening property is concerned, there is also great difference. A good enamel should dry through and through, and not merely on the surface. Generally speaking, the slower drying enamels are the best in

this matter, but to make a test it is only needful to coat some pieces of glass with the various enamels, and to try them with equal pressure of the thumb nail after they seem to be hard. Those which are thoroughly hard will not abrade so easily as the others. When it is found that an enamel dries mainly on the surface great care must be taken never to apply it thickly, as the defect is thereby augmented, and, indeed, liable to cause another defect—that of cracking, wrinkling, or loss of lustre. This property of thorough hardening is essential to all enamels, but is doubly so to those used on baths and furniture.

### OTHER PROPERTIES.

In addition to the qualities above mentioned, all but the ordinary gloss enamels have other special properties. Bath enamels, for instance, must be capable of withstanding hot water, frequent washing, and, to some extent, the action of soap in solution.

Stoving enamels, again, must be made to stand a high degree of heat without injury to gloss or surface. These enamels as commonly used are for cycles, bedsteads, and other work which requires stoving or burning by the action of heat so as to be more hard and durable. These are very seldom used in the decorating trade, however.

Petrifying enamels, on the other hand, must be capable of resisting damp, and are specially manufactured for cellar walls and other parts liable to be damp. These, it may be noted, are a speciality of Messrs. Harland and Son.

### FLAMBOYANT ENAMELS.

So far these have not been treated, as they have only the properties of drying, lustre, and flowing in common with the others. They are employed on glass, tin, and other bright metals, and are transparent and rich in colour, making satisfactory imitations of

stained glass and lacquered tinware. They dry in eight hours, and may be stoved if thought necessary or found needful. They are manufactured by Messrs. Mander Brothers.

### FLAT ENAMELS.

These dry with a flat or eggshell gloss, and are commonly used in place of flat paint, being generally capable of standing much more wear and tear. A good flat enamel should possess:—

UNIFORMITY OF APPEARANCE.—When properly manufactured, and properly applied, it should dry out with a surface quite devoid of gloss, or with a uniform eggshell lustre. If the enamel flashes after quick application it is generally defective.

EASE OF APPLICATION.—The ideal flat enamel should work cool—that is, it should not begin to set before sufficient time has elapsed to work it properly. When applied to a panel it should not begin to set till at least ten minutes after unless the temperature be exceptionally high.

FLOWING PROPERTY.—A good flat enamel should require little softening off, as it should of itself flow out, and set without any brush marks being visible.

OPACITY.—This is also an essential property, and in cheap work its presence or absence may make all the difference between a good job and a bad one. As with gloss enamels, this material is also often employed to give the under surface uniformity of colour, and is expected to have as much body as ordinary flat paint.

NOTE :—All these may be tested for the qualities mentioned in the manner given for gloss enamels.

### STOVING FLAT ENAMELS.

Besides having the above qualities, these must withstand heat to be suitable for the purpose indi-

cated. Comparative tests may be conducted by enamelling pieces of iron with different enamels, and stoving them at a similar temperature for a similar length of time, noting whether they lose their flat appearance and become much darker in colour. If they do they are defective for the purpose mentioned.

## CHAPTER XIV.

## ORDINARY ENAMEL WORK.

## WOODWORK ENAMELLING.

Although the ground for this is invariably in some form or other of paint or washable distemper, it nevertheless, varies a great deal according to the class of work to be done. Between the grounds of the poorest class and those of the best there is a great difference as regards number of coats and kind of material employed. The cheapest bringing up and grounds are usually covered with the cheapest enamels, but apart from the quality of enamel employed, all enamel work may be classed as good, bad, or indifferent, according to the preparatory work and grounding it has received. A cheap enamel on a high-class groundwork may not make the best job, but in many ways it gives superior results compared with a high priced enamel on a poor groundwork. Thus, then, there are grounds to suit the following classes of work :—

**LOW CLASS WORK.**—Within this class there are various grades of cheapness, the majority of which, unless specially specified, should be avoided by all respectable painters. Generally the only use for which such grounds are truly legitimate is when enamel work of a temporary character has to be done hurriedly. In such cases the ground may be a coat or two of patent knotting and one of paint, or two coats of washable distemper and one of paint, or even two of size and one of paint, on new wood. On old woodwork one coat of paint, or one of washable distemper and one of paint

sometimes form the ground, but one coat of Duresco as a filling up medium and two of paint, or simply the paint alone, may be used. Sometimes in extreme cases the enamel is applied directly on the top of washable distemper, but, needless to say, its lustre is thereby impaired at once. When such treatment has to be resorted to, the distemper should have been on for some time so as to be thoroughly hard, otherwise it should be sized. Very little preparatory work is usually done under this class.

**MEDIUM CLASS WORK.**—A preliminary preparation consisting of washing with soda solution and rubbing down with lump pumice, puttying, and painting three coats most frequently constitute the ground for this, and on good new woodwork and well prepared old work, a very passable job is often obtained. A slightly better job is obtained, though usually far from the highest class, by filling with filling up composition, and coating four times, the last coat being, if the ground is already sufficiently covered, one of oxide of zinc in cases of white finishes. In filling such work, the composition should always be tinted to match the paint or ground on which it is to be applied. This is especially necessary in white work where after the first coat and previous to filling, the paint will appear greyish when contrasted with the creamy filling. A little black will usually bring the composition to the proper tint, and thus sometimes obviate an additional coat of paint. When a coloured finish is required, each coat should be made to correspond to the colour of the enamel, the finishing coat, if not exactly similar, being but slightly darker so as to enhance solidity of finish.

**HIGH CLASS WORK.**—The preparation and ground for this should be almost similar to those mentioned for best varnish work finish, the difference being, when there is any, that fewer coats make a good ground. It is advisable, however, to consider grounding for high class varnishing and for high class enamelling as the same ; for although the opacity of enamel might render

the identical number of coats unnecessary, it can by no means make the ground smooth. This is an important matter ; for even though the ground may be brought to a uniform colour, several coats may still be required, combined with thorough rubbing down, to bring it to the desired smoothness. Six thin, hard drying coats may be brought to a perfection of surface unattainable by giving three thick ones. When the surface colour and smoothness are good to begin with, fewer coats suffice, but generally speaking the lowest number suitable for this class of work is five—four of lead and one of zinc or special undercoating in cases of white or ivory work. On a good and properly prepared surface, a first coat, then one of filling, a second coat, then another of filling, and afterwards four coats, make a ground sufficient for the highest class of finish when it has been properly rubbed down between each of them. For pure white work, the last two coats would be oxide of zinc, and would be finished with two coats of enamel. Where more coats of filling are required, or the old surface is to be quite changed in colour, a great many more coats of paint are, of course, necessary. Sometimes, as in coach painting, no fewer than ten are advisable. In any case, whether a fewer or greater number of coats is given, it must never be forgotten that skilful application of the paint and sound preparatory work are also factors in the pursuit of success. Details concerning these have already been given under varnish work, and need not be repeated.

APPLICATION.—What has been said relative to the application of varnish also applies here. The condition of the atmosphere, the floor, the pots and brushes, the surface, and the worker's clothes having been attended to, the enamel is laid on with up and down strokes, one crossing or at most two, and finally finished in the direction of the wood. Enamels are tougher to spread than varnish, therefore great care must be taken not to put more on one part than another. Although an enamel should flow out perfectly even after heavy



pressure with the brush, it is always advisable to finish off with but a slight pressure, and on bad flowing, quick setting enamels hardly any pressure at all should be exerted. Generally speaking, the quicker an enamel is applied, the better will the finish be in cleanness and smoothness. When two coats are given the first should be thinly applied so as to harden quickly and rub down easily, but in all other cases if the work is to be finished with the brush, and not by felting and polishing, a full coat should be given.

NOTE.—As enamel or varnish brushes are liable to lose their elasticity when kept in turpentine, they should always be placed in a vessel containing pure linseed oil. When brushes have lost this quality it is much more difficult to apply enamel properly with them, especially at tops and bottoms of panels.

FELTING AND POLISHING.—These operations are carried out similar to those on varnish work.

### ENAMELLING PIPING, RADIATORS, &c.

PREPARATION.—Generally when these articles are new a thorough sandpapering is all that is necessary. In the case of zinc surfaces this method is, of course, useless; therefore a preparatory coating of a suitable mordant should be given to assist adhesion of the paint. One may be made by mixing together one part each of nitrate and chloride of copper and sal-ammoniac in water sixty-four parts, then adding to the mixture one part of common hydrochloric acid. This partly softens the surface, and may be effectively painted over next day. Old surfaces, whether of lead, iron, or copper require washing thoroughly as well as sandpapering.

GROUND.—Three or four coats are usually sufficient for this kind of work; indeed, on hot water pipes and radiators the fewer coats the better so long as the colour is uniform. When much heat has to be resisted, the paint should always be composed of equal quantities of japan gold size and American turpentine mixed with oxide of zinc or other heat resisting pigment as a base.

Besides the above white pigment, the most suitable for this purpose are Naples yellow, Venetian red, Indian red, ultramarine, cobalt green, burnt umber, burnt sienna, and lamp black, as they do not, like the majority of colours, become darker when heated. In any case, the paint should be made a trifle lighter than it is intended to appear so as to allow for any change, and to give best results it should be applied to the pipes or radiators while they are slightly heated. This latter precaution makes the paint adhere better, and less liable to turn colour afterwards.

On cold water pipes white lead or any of the other ordinary pigments may be used, and should be mixed as above stated or with varnish and turps. Duresco also forms a cheap yet effective ground for both classes of piping and for radiators, if the white quality which is liable to "yellow" be excepted.

APPLICATION.—This is so simple a matter that directions need not be given. Care should be taken, though, to see that the enamel used is suitable for resisting heat, otherwise the work may be marred. Several of the enamels now in use are quite suitable for this purpose, but by heating a radiator and applying a brushful of the material on the bare iron, a fair test is constituted. For white work this test is especially necessary.

## ENAMELLING CEILINGS AND WALLS.

PREPARATION AND GROUND.—When the surfaces are badly cracked or broken, they should be mended with plaster of Paris, and afterwards papered with a stout white lining paper so as to form a suitable ground for painting. Before proceeding with this latter operation, the joints must be well rubbed down so as to be invisible when the whole is painted. For ordinary work a priming coat, a filling up coat, and three subsequent coats will usually do, the first coat being very oily as it is quickly absorbed by the paper, the next over the filling being half and half, and the remaining

two being mixed with equal quantities of varnish and turps without driers. On higher class work the operation is the same until after the second coat when another filling up coat may be applied, then painted several coats of sharp varnish and turps colour until a smooth and uniform surface has been obtained, after which a final coat of half varnish and half turps colour should be given. Thorough rubbing down of the filling coat with lump pumice and water, glasspapering of the other coats, and time for hardening between each coat, are also essential here, although in painting walls for flattening these operations are frequently omitted. On very porous walls, it may be noted, two thick coats of Duresco are very useful, and rub down to a good surface with pumice, in fact, any good washable distemper may be recommended for this purpose on bare ceilings or walls, but not on those which have been painted, as paint at all fresh beneath may induce cracking. In glasspapering this work, a level block of wood or cork is necessary over the sandpaper to ensure the surface being rubbed perfectly level. Rubbing with the paper merely in the hand is liable to be very unequal on such large surfaces. On the highest class work of this description the last two coats are felted down with finely levigated pumice, as this makes a better surface than sandpaper can in any case possibly do.

ENAMELLING.—The application of enamel to ceilings and walls requires quick working and care. Two, three, or four men may be required for the one ceiling or wall to ensure the edge being kept going, otherwise if the enamel set during working, gathering and ribbing may result. Each brushful should be laid close to the last brushful, and after three or four have been laid on the whole should be crossed to spread the material properly, and finally laid off. In coating walls the topmost man should always be a brushful or two in front of the man immediately below him, and so on, to allow of freedom in working, but care must be taken not to exceed this distance in case of the horizontal

joinings of each stretch setting before time has been allowed to finish one man's division into the other's. With quick setting enamels this latter precaution is especially necessary. To avoid the slight bareness or drawing away of part of the enamel at the horizontal joinings, the top man's stretch should be finished upwards, then the next man's in a similar direction, and so on to the bottom. By this successive and identical procedure, each division is finished into the other, forming a properly finished whole. On ceilings again, each man's stretch should be almost kept in a line with the other's, the man nearest the light finishing off first into the cornice, and the others finishing successively in the same direction.

NOTE.—The above class of work is greatly facilitated or greatly hindered according to the kind and quality of scaffolding employed. Light and strong trestles and plank erected at each side of the room form a good gangway on which to place a plank, the latter being simply shoved along on the top of the side planks at the finish of each complete stretch. When steps are being used to work from at important walls, it is a good plan to muffle their feet with soft rags or packing cloth, so that they may at once be pulled along easily and without dust, by catching the hind portion or stretchers. This is especially needful when the steps are high or heavy, as it is much quicker and handier than lifting them.

POLISHING.—Only in exceptional cases is this done on ceilings and walls, the reason for its omission being that ceilings are out of reach, and walls are for the most part covered with pictures and hangings, and hidden by furniture. When the process has to be done, though, it is simply a matter of repeating the operation given in detail in the section on varnish work.

## CHAPTER XV.

## ORDINARY ENAMEL WORK

(continued).

## FURNITURE ENAMELLING, ETC.

CHEAP WORK.—This class of enamelling is generally applied to cheap, inferior furniture when new, and previous to enamelling mainly consists in coatings of size colour or washable distemper. A not unusual method is to give the work two coats of strongly bound size colour, to rub this down, then give a coat of japan gold size, and one of paint. Instead of this a coat of thick Duresco is sometimes given, then two of japan gold size and turps without any paint, or one of that, and one of paint. These methods are not trustworthy, of course, but they are inexpensive, and although the size colour is very liable to chip with the slightest knock, it acts as a filler and paint combined.

HIGH CLASS WORK.—Unlike the preceding, this work is expensive, and when well done exceedingly durable. Among all the common jobs given to the decorator this is one of the most intricate and particular, and therefore extreme care should be devoted to every phase of the work from start to finish.

PREPARATION.—If the furniture is new, this operation usually consists in thoroughly sandpapering all quirks and turned parts with coarse sandpaper, and the plain surfaces with a finer grade. This is quite a simple matter until the work has been coated, but after that much skill of hand is required to rub down such parts without injury to the sharp edges. Glasspaper

for this work should be extra tough so as to bend readily into any desired shape without immediately tearing into shreds, and should be cut into suitable strips for the various intricate parts. After the first coat, No. 1 and No. 0 sandpaper only should be used, the latter being reserved for rubbing down the final coats. When furniture is old and badly chipped and cracked, a more tedious process than a preliminary sandpapering must be gone through. The preliminary preparation then consists in removing the old defective paint, polish, or whatever it may be, with a non-injurious paint remover, and finally washing the whole down with turpentine. A scraper may be used to assist removal of the softened paint film, but if possible only rags dipped in turps should be used for that purpose. At any rate, on all recessed parts this method is always the only proper one, as scraping with a knife is liable to scratch the wood at such parts. This initial process having been gone through, the work should now be sandpapered before first coating. Old furniture in good condition, of course, only requires the usual washing with soda solution and careful rubbing with lump pumice, curved and round portions such as chair legs being well sandpapered when dry. Owing to the difficulty of getting pumice to fit the shapes of these latter parts, it is always advisable to use glasspaper on them, for pumice which does not lie properly against the surface is almost sure to scratch the work. French polished furniture may be painted after a preliminary wash and rub with glasspaper, but if the polish is not adhering very firmly, it should be removed to give a less brittle foundation. The volatile paint remover already mentioned is best for this purpose, but a wash or two of methylated spirits will also soften the film effectively, although it is somewhat slower in action.

GROUND FOR HIGH CLASS WORK.—When furniture is new or has been cleaned to the wood, the best priming is that composed of hard copal varnish, a little turps, and white lead. This should be applied thinly so as to

penetrate the wood thoroughly, and after it has hardened should be rubbed down, and puttied with hard stopping made with dry white lead whiting and japan gold size. This puttying is mainly intended for any open joints, and after it has become hard, another coat of paint consisting of a little japan gold size, one third varnish and two thirds turps combined with white lead or other pigment as required, should be given. After this two or three coats of filling should be applied with a good broad chisel or scraper on the flat surfaces, and with a brush on the curved parts. For laying with the brush the filling up paste should not be much thicker than good stout paint, so that it may be laid easily without leaving streaky ridges difficult to remove afterwards. Between each coat of filling, sandpapering should take place, and, if necessary, rubbing down with lump pumice. If after this the surface is not absolutely smooth, other coats of filling should be given until it is. To make sure that the surface is quite level, it is sometimes advisable, especially when working away from the light, to give the filling a guide coat. This is simply a thin contrasting coat of sharp paint, almost flat, which when properly rubbed down shows by its difference in colour any inequalities of the surface.

The surface now being level, two coats of the second coating paint should be given to prepare for the proper finishing coats. These latter consist of white lead ground in turps, and up till the last coat thinned down with equal quantities of white oil varnish and turpentine, the last coat being slightly different in having a little more varnish. All these coats should be merely thin washes of colour, and should be allowed to harden for two days between each application, and, if possible, even longer. The rubbing down between each coat should be done with the finest sandpaper until the last two coats when ground pumice and felt should be substituted. The number of these final coatings varies under different circumstances. If a flawless appearance is not gained by six, then seven must be given, and so

on till ten, twelve, or even fifteen may have been applied. After several days the ground thus formed is ready for the highest class of enamel work or polished finish.

ENAMELLING.—All the instructions already given in regard to the application of varnish and enamel applies here, but as furniture is intricate, and has many small sharp edged surfaces, much care must be expended in avoiding “fat” edges of enamel and runs. The bottom bars and legs of chairs should be coated first, then the back, and finally the fronts and bottoms, or seats. If possible, each article should be placed on clean blocks of wood about two inches high, and kept in this position during the work, and until thoroughly dry. This enables the work to be done without moving the furniture, and, in consequence raising a dust. The tops of chests of drawers, washstands, tables, and seats of chairs should be done with a different brush from that used on the other parts, as the application of enamel to those portions is liable to dirty the brush, owing to the minute particles of dust in the atmosphere, despite every precaution to the contrary, falling constantly on horizontal surfaces. Though in general practice heavy coats of enamel are necessary to obtain a smooth flow in this particular class of work such is not needful for two reasons. First, the surface is already as smooth as possible, and a light coat laid on without working it much is quite as satisfactory in appearance as a heavy one ; second, a heavy application on work likely to be handled and sat upon sometimes leads to tackiness—a grave defect in furniture painting of any kind. When the first enamelling has been allowed to harden for at least a week, it may be sponged with cold water to still further harden the film, and then felted with pumice powder—the finest quality—and finished with another coat or polished.

NOTE.—Where much furniture painting and enamelling are done, a special room should be set apart for such work only. It should be well lit, have a



heating radiator at each end, but no fire-place. Strips of felt should be tacked round the door, bottom and sides, to prevent draughts, the necessary change of air being brought about by ventilators at the top of the walls. When in use in winter, the apartment should be kept heated continually at about seventy degrees Fahr. This amount of heat must not simply be tested by feeling, but by having a thermometer hung in the middle of the room.

POLISHING.—This operation has already been described, and in the case of furniture brought up as here advocated, it is to be recommended. After all the labour involved, the enamel, though perfectly smooth, may be slightly specky. Felting and polishing will remove any slight defect of this nature, and give the work the highest possible finish. If the furniture is to be pure white polishing the enamel coat is the best, but if purity of white is not much desired, the ground itself may be felted and polished with as good result ; for under the operation of polishing the varnish colour ground comes out with a hard, brilliant, and durable lustre. Putty powder and water alone should be used for finishing, the final cleaning off being done with dry flour or finely powdered French chalk. For details concerning polishing, see varnish work.

### BATH ENAMELLING.

When metal or stone baths require re-enamelling after the stoved enamel surface has become worn, very seldom is it suitable, or, owing to the expense involved, worth while having them removed for similar treatment. This gives the decorator more bath painting and enamelling than he otherwise would have, but at the same time gives him the extra difficulty of bringing up and finishing such work so as to stand the action of hot water and frequent friction. Needless to say, his treatment cannot compare favourably with a stoved surface, but if done in the proper manner with the proper paint and enamel, a bath in regular use should

last for about two years, and if taken care of may last much longer. The best results may be obtained by attending to the following instructions :—

PREPARATION.—If the bath has been stoved previously, this operation consists in washing, then thoroughly rubbing the surface with coarse sandpaper or emery cloth, or with steel wire wool. Much pressure must be exerted in rubbing so as to abrade the surface slightly, and thus form a key for the paint. While the bath is wet with the washing, it is a good plan to do the rubbing with emery cloth, as the water makes the cloth adhere much closer to the surface, and in consequence aids the necessary amount of abrasion quicker than otherwise. When the bath is a wooden one, and in bad condition, it is invariably advisable to burn or clean off the paint. Cleaning off with a harmless paint solvent, such as “Pintoff,” is to be recommended, as any char marks caused by a lamp in burning off, are difficult to hide with paint, and render the wood soft at such parts. When a wood bath has been badly worn, and the water has penetrated the bottom, the lamp may, however, be used with good results for the purpose of drying the wood previous to painting. When old enamel and paint on any kind of bath are cracked, the cracks should never be filled up if a satisfactory job is at all desired, as sooner or later all such markings show through in the finished work despite the use of filling composition. Old paint and enamel surfaces if not in an unsound state may simply require rubbing with pumice, but those cracked or otherwise marred should be removed. After this initial operation, the bath should be thoroughly dried, dusted, and the taps plugged with corks to ensure that no water will find its way from them into the bath during the painting operations.

GROUND.—The paint for this purpose should be made of white lead mixed with equal quantities of japan gold size and pure American turpentine, and a little copal, or preferably bath varnish. Neither patent driers, terebine, nor linseed oil should be used, as these

are all more or less detrimental to the durability of the finish. The paint should be used in a thin rather than a thick state, and should be made in exactly the same way for every coat—the least excess of gold size or varnish in one coat beneath another being liable to cause cracking. To work up a good surface four coats are usually required, but this depends on the state of the bath to begin with. After the first coat any dents in wood or chipped parts in stoved enamel may be filled with a paste made from ground slate or from dry white lead mixed with the above media. Dry white lead, it may be noted, is most suitable for white baths owing to its colour. The filled parts having been rubbed down and touched up, painting should be proceeded with at intervals of at least two days, the last coat being allowed to stand from three days till a week previous to enamelling. This hardening time is necessary to enhance the durability of the finish, and must be allowed.

ENAMELLING.—Two coats of special bath enamel are essential to appearance and durability, and should be applied at an interval of one week, the first coat being well rubbed down and dusted during the middle of the week so as to let its under surface be exposed to the air, and thus still further harden. In applying the enamel, it is best to coat the top, or tap, end of the bath first, then the side next the wall, and finally the foot, near side, and bottom. By this method the enamelling is carried round to a part where joinings will not show badly even in a round or oval headed bath, this part, of course, being between the top of the near side and the top end. A good heavy coat should be applied the second time, and only a light coat the first time, each being laid off in the upright manner if at all suitable. This is advocated because it is much easier to avoid runs in this way—and runs are a source of much annoyance when baths are enamelled in the horizontal direction. As these enamels are generally quick in

setting, they should be laid on quickly to allow of proper flowing out.

**HARDENING THE FILM.**—To do this is easy, and worth while. After the bath has been finished for two or three days, it should be filled with water, and allowed to stand for twenty-four hours in that condition. When the bath is emptied at the end of that time, its surface will be found to be still as glossy, and much more impervious and hard.

**TO LENGTHEN THE LIFE OF A BATH.**—The surface of a painted and enamelled bath may be kept intact for a sufficient length of time if the users attend to certain instructions which the painter, for his own credit, should give them. These instructions are :—(1) Always to put in sufficient cold water to cover the bottom prior to turning on the hot (2) To empty the bath immediately after use. (3) Not to wash and rub the surface with “Monkey Brand” soap or other composition which abrades it. (4) Not to use a scrubbing brush and soft soap for washing, but always to clean it with a soft rag or sponge, cold water, and toilet soap, taking care to rinse it freely with water at the finish.

### EXTERIOR ENAMEL WORK.

This is done in precisely the same way and under the same conditions as already given for exterior varnish work. Enamels for this purpose, when tough and difficult to work, should never be thinned with turpentine, as a loss of wearing property thereby ensues. A little white or French oil varnish is the best for this.

### DEFECTS IN ORDINARY ENAMEL WORK.

Several defects are liable to occur in this class of work. Some are due to the enamel, some to the worker, and some to the atmosphere. When once the cause of any defect is known, its avoidance is much easier in the future ; the before the following defects and their causes are given :—

LOSS OF LUSTRE.—This may be due to enamelling on an improperly hardened ground or a ground in which there has not been put sufficient varnish to render it non-absorbent. Tampering with the enamel, such as thinning it with turps, with inferior varnish, or raw linseed oil, may also be the cause, and likewise the use of an inferior enamel or a scanty coat. Draughts and changes of temperature from higher to lower, are also risky in this respect. Loss of lustre due to these last is sometimes termed “fogging.” On exterior work, a cloudy-looking appearance properly called “fogging” is liable to occur if the air is moist or a fall of moisture takes place before it is properly dry.

DISCOLOURING.—The discolouration, if yellow, may be caused by a ground of white lead, by oil in the under coats, by a very dark varnish having been used in making the ground, or by the use of patent driers. It is, however, very often due to the enamel itself being made with an inferior vehicle, an imperfectly selected enamel pigment, or unsuitable driers. When blueness is the defect, it is invariably due to the enamel having been made with an improper pigment, or having had blue combined with the original pigment to make the enamel appear perfectly white at first.

TACKINESS.—This may be a defect in the material, or may be due to the ground having been brought up too quickly; that is, not enough time having been allowed between the various coats. It may also be due to too much driers in the under coats, or to oil having been used to excess in the same. If the enamel is to blame, frequent sponging with cold water will eventually remove the defect, but in the other case, cleaning off and redoing is the only real remedy.

CRACKING.—A soft groundwork, or one with too much oil, or japan gold size, is liable to cause this unless the enamel is very elastic. When the defect is not caused by the ground, it is due to a hard, brittle enamel being exposed to the sun's rays or other heat.

ROPINESS.—Imperfectly made enamels and those which have stood for some time in a cold store are liable to this fault. Sometimes too much working, especially with a quick setting enamel, will cause this. Very cold weather, by making the enamel viscid and tough, also prevents flowing out to a smooth surface, as does too high a temperature.

GRITTIENESS.—Due to the decorator's foe—dust. It may be in the enamel, in the brushes, coming from the clothes, rising from the floor, or falling on the work from the atmosphere. The preventative of this defect, which is the most prevalent in otherwise high class work, is obvious, but requires much attention.

RUNNING.—Due to unequal spreading, or to the material being too thin to allow of heavy coating, or to its setting too slowly. In the second case exposure to the air is beneficial, in the last, a very little pale terebine.

BLISTERING.—This is seldom due to the enamel, almost invariably it is a product of an oily ground under exposure to heat.

WRINKLING.—Caused by a heavy coat of a surface drying enamel, especially on sills, bottoms of sashes, and so on, where it is liable to be floated on extra heavily. Both the enamel and the worker is to blame for this.

CHIPPING.—Any enamel will chip under a sufficiently heavy blow, but those of a brittle nature are liable to this defect on the slightest knock. Thinning an enamel with turps increases this liability, as it lessens the tenacity and elasticity of the material.

## CHAPTER XVI.

## FLAT AND OTHER ENAMEL WORK.

## USING FLAT ENAMEL.

On old painted wood, walls, and ceilings, the preparation usually given for flat painting suffices also for this, but if the walls are rough or badly chipped, they should be mended, and hung with a white lining paper in addition to any other preparation.

GROUND.—In bringing up a ground for flat enamel, the usual oily priming coat may be given on new wood, or new walls, and on papered walls, and after that sharp coats to the number required. On no account should the ground be oily, as if for flat paint, for such a ground under these enamels is liable to cause cracking. After the priming coat on new work, two coats of paint made in the proportions of one-fifth oil to four-fifths turpentine are generally sufficient. Between these coats a day or two should always elapse so that the life may be out of the paint to some extent before the next is applied. On the best class of work, an additional coat is given, and the paint is made with Japan gold size and turps in the proportions mentioned above. In cases of hurried work, the enamel itself is used without any intervening paint, as two coats can be applied on the same day—one in the morning and one in the evening. On new plaster or cement, it may also be applied after a coat of knotting has been given.

ENAMELLING.—Any one accustomed to flat painting can apply flat enamel, the main thing about it is to have it laid on properly before it begins to set. Quick

application is necessary, and ceilings and walls should always be stippled. Sometimes woodwork is also stippled, but such treatment is not recommended, unless the material is actually unworkable. A good coat should always be applied with little or no crossing and softening off, for brushmarks flow out of themselves, and the less working the better the flat. To increase the flat appearance, smoothness of surface, and durability, two coats are necessary, with the usual rubbing down between each coat. If desired, an excellent egg shell gloss may be had by felting the finish.

### DEFECTS IN FLAT ENAMEL WORK.

FLASHING.—This defect is sometimes inherent in the enamel, but in most instances it is due to an improper or slow method of working it. When these alternate glossy and flat markings are due to the enamel, it is generally because of its being too thick, or containing too much binding medium. In other cases, again, it is caused by the worker not stirring the material sufficiently or frequently enough, or by the necessity of two coats when only one has been given; for some flat enamels do not flat perfectly until two coats have been applied.

BRUSH STREAKINESS.—Good flat enamel work should not show the direction in which the material has been applied; it should have an even grain or surface quite devoid of streakiness. When this defect does occur, it is mostly due to the worker having brushed at the enamel too long, or to a roughly painted ground.

### FLAMBOYANT ENAMELS.

These require no grounding nor preliminary preparation apart from a thorough cleansing of the surface to be treated. Glass should be rubbed well with whiting and water to remove any grease, then well



dried and polished before applying the enamel. Tin or other light reflecting metal, for which these enamels are used, may be cleaned with a solution of pearlash, but neither these nor glass should be sandpapered, as such procedure means scratches which are liable to show through the transparent film.

These enamels may be either stippled or laid off with the brush. On glass they should usually be stippled if there is any difficulty in working them, as thinning with turpentine to aid application is not advisable, owing to its lessening the adhesiveness and brilliancy of the enamel. With a soft brush in skilful hands, the best effect can, however, be obtained. A medium coat only should be given, crossed lightly, and softened off like paint, so that it may flow out to a uniform appearance. Whether on glass or tin, the application should be done quickly, and as free from dust as possible. These enamels may be stoved at a temperature of 140 Fah., but whether treated in this way or air dried, one coat only is necessary.

### STOVING ENAMELS.

The using of these enamels does not, strictly speaking, belong to the house decorating trade, and as a stove or heating chamber besides other apparatus are necessary, the subject will only be touched on here. These enamels are used mainly for metal work, cycles, bedsteads, tea trays, and so on, and when stoved at a suitable temperature form a much harder and more durable surface than otherwise would be. A preliminary grounding enamel or the finishing enamel itself is applied to the clean metal either by means of a soft brush, or by pouring from a ladle, and the article thus treated is immediately afterwards hung in the stove until it is thoroughly hard—the exact time depending on the metal treated and the properties of the enamel employed. In connection with this class of work, it may be worth mentioning that the enamelling

stove is a special and expensive apparatus lined with rows of gas jets, and cannot by any means be replaced by the ordinary oven. The temperature of this last cannot be kept equable, or made high enough, and the available space is not large enough, for most work.

### PETRIFYING ENAMEL.

This material is intended for walls where ordinary gloss enamels might not stand, and, unless in the case of very damp walls, is applied direct to the plaster or cement. Three coats are usually sufficient, but when walls are very damp or porous, these should be preceded by a coat of Harland's Transparent Petrifying Liquid. Before applying these enamels, the walls should be dried as much as possible, sandpapered, and mended where necessary with plaster of Paris. In applying, the undercoats should be put on sparingly, the finishing coat freely as in ordinary gloss enameling, but always, if at all possible, without thinning, as this is detrimental to the durability of the material.

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